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No. 11.—Vol. 16.
May, 1896.

The Practical Teacher

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A MONTHLY EDUCATIONAL JOURNAL.

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Wisdom is humble that he knows no more.'—COWPER.

VOL. XVI. NO. 11. MAY, 1896. PRICE, 6D. POST FREE, 8D.

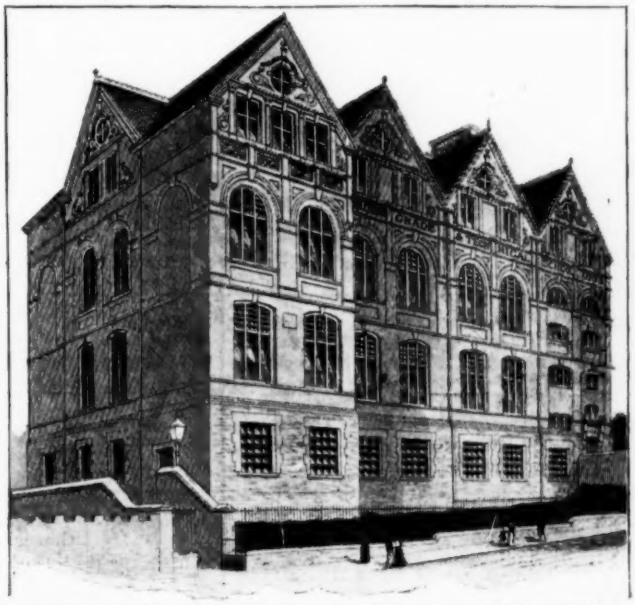
WELL-KNOWN TEACHERS AT WORK.

No. XLIX.—MR. F. PICKLES, M.A.

Higher Grade and Organised Science School, St. George, Bristol.

In the east of Bristol, but outside the municipal boundary, is situated the large parish of St. George. Its School Board has to deal with nearly all the elementary education, as there is but little voluntary accommodation. The School Board consists of nine members, and, in addition to the school of which we are now writing, has the control of about twenty school departments.

The whole district is essentially the home of the worker—boot-making being a considerable industry in the neighbourhood. On Oct. 18th, 1894, was opened the Higher Grade and Organised Science School, which the Board rightly regards as its crowning effort in the way of school provision for the district. It is a splendid pile of buildings, situated on the main road along which the electric tram passes from Bristol to Kingswood, &c., and is the most conspicuous building in the neighbourhood. It is built of brick and terra-cotta, and roofed with green slates, and the floors are all fireproof. In the basement is provided a metal workshop, 52 feet by 31 feet, and supplied with forge and all the necessary fittings. There is also a wood workshop, 52 feet by 21 feet. On the ground floor there is a central hall 52½ feet by 32 feet, and a class-room 27 feet by 25 feet, separated from it by a glazed movable partition, so that when required this room can be added to the hall for lectures, public meetings, &c. On the same floor are long double class-rooms, 59 feet by 22 feet, and another 25 feet square. The first floor is laid out in exactly similar manner, the lower one being devoted to the girls and the upper to the boys. On the second floor is a Chemical Laboratory, 40 feet by 26½ feet, with a preparation room adjoining. There is also a Physical Laboratory, 37 feet by 22 feet, and two splendid Art rooms, one 52 feet by 25 feet, the other 22½ feet by 22 feet. Each floor is well furnished with good cloak-rooms and lavatories, and there are separate entrances and staircases for boys and girls. The building is so constructed that the Science and Art Department may be approached independently of the others. There are also Teachers' rooms on each floor.



HIGHER GRADE AND TECHNICAL SCHOOLS, ST. GEORGE, BRISTOL.
Front view, facing main road.

The ventilation and lighting are excellent, the former being carried out on a system in which are hot-water coils and pipes, the coils containing large

ST. GEORGE HIGHER GRADE AND TECHNICAL SCHOOLS.

TIME TABLES.

ORGANISED SCIENCE SCHOOL—GIRLS' SECTION.

DAYS.	9—10.	10—10.55.	10.55–11.10	11.10—12.	2—3.	3—3.55.	3.55–4.10.	4.10—5.
MONDAY -	Geometry	Euclid	Recreation.	English Grammar and Composition	Theoretical Chemistry	Algebra	Recreation.	Music, Drill, or Art Needlework
TUESDAY -	French	Physiology and Hygiene		English Literature	Euclid	Elem. Science (Physics)		Geography and History
WEDNESDAY	French	(*a*) Dressmaking (*b*) Practical Chemistry			Geometry	Household Management		History and Geography
THURSDAY -	French	Euclid	Recreation.	Eng. Literature or Art Needlework	Algebra	Physiology and Hygiene		English Grammar and Composition
FRIDAY -	Freehand	Algebra		Physiology and Hygiene	Theoretical Chemistry	(*a*) Practical Chemistry (*b*) Dressmaking		

FREDERICK PICKLES, Head Master.

ORGANISED SCIENCE SCHOOL—BOYS.

DAYS.	9—10.	10—10.55.	10.55–11.10.	11.10—12.	2—3.	3—3.55.	3.55—4.10.	4.10—5.
MONDAY - -	Theoretical Physics	Euclid	Recreat.	Theoretical Chemistry	French	History and Geography	Recreation.	Freehand
TUESDAY - -	Euclid	Practical Physics Practical Chemistry Manual Instruction			Shorthand Book-keeping Arithmetic	Algebra		History and Geography
WEDNESDAY - -	Geometry	French	Recreation.	English Grammar and Composition	Algebra	Manual Instruction Practical Chemistry Practical Physics		
THURSDAY - -	Algebra	Theoretical Chemistry		Theoretical Physics	English Literature	Practical Physics Manual Instruction Practical Chemistry		
FRIDAY - -	French	Shorthand Book-keeping Euclid		Shorthand Book-keeping Euclid	Geometry	English Grammar and Composition	Recreation.	Music and Drill or English Literature

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FREDERICK PICKLES, Head Master.

fresh air inlets; exit or exhaust ventilators are also combined with the smoke flues, the air flues being divided by a thin fire-clay partition. Altogether, the internal arrangements have been well carried out, and the health of the students studied to a commendable degree. The accommodation is for 500 students, of which there are 125 free places. These free places are offered as Scholarships to the boys and girls attending the Elementary Schools in the parish, and it is significant of the people's appreciation of the school that there were 600 candidates examined for these scholarships when the schools were opened.

The first Head Master was Mr. F. W. Westaway, B.A., F.C.S. He did excellent work in starting the organisation of the school, but after not quite a year's work was appointed an Inspector of the Science and Art Department. He was succeeded by Mr. F. Pickles, M.A,, the subject of our sketch this month.

Yours Faithfully
Fred K Pickles.

Mr. Pickles was born in 1867 at Great Horton, Yorkshire, and in due course became a Pupil Teacher for four years at the National Schools there. At the close of his apprenticeship he won a First-class Queen's Scholarship at the famous Moray House Training College, Edinburgh, and was also awarded a bursary tenable for three years at the Edinburgh University. He was a prizeman both of his College and of the University, and graduated as M.A. in 1892. On leaving the University, Mr. Pickles became an Assistant Master in the Chapel Street Higher Grade School, Bradford, and also worked some time in the Bradford Central Classes for Pupil Teachers under Mr. J. W. Young—a gentleman who has left an excellent impress on the Teachers who have been trained under him, and who raised his Pupil Teachers' Classes to the front rank and kept them there. From here Mr. Pickles removed to the Training Classes for Teachers at Birmingham as an Assistant to the Director, Mr. J. McLaren, B.A., and while holding this position had practically sole charge of the boys' classes. This gave him an opportunity to carry out the project of not only preparing the Pupil Teachers by the end of their fourth year for the Scholarship Examination, but for the Matriculation Examination of the London University as well. In reply to a query whether altering the course of study to suit the London Matriculation interfered with the success at the Scholarship Examination, Mr. Pickles replied, 'I do not think the modified course of study at all interfered with the success at the Scholarship Examination, for in 1894-5 many of the lads took high places in both the Matriculation and Scholarship Examinations, one being third on the list in the latter.'

Mr. Pickles was appointed to the Higher Grade and Organised Science School, St. George, in August, 1895, and we are indebted to his courtesy for the facts we are able to communicate respecting the school. The school really consists of two distinct departments—the Higher Grade School, containing Standards V. to VII., and the Organised Science School, taking on the boys and girls above Standard VII. to about the age of 17, with the London Matriculation Examination as the final examination.

The course of studies is admirably arranged in both departments. Taking the Higher Grade School first, in addition to the ordinary school subjects, both boys and girls are taught French, Elementary Experimental Science, Euclid, Algebra, and Commercial Correspondence. The boys also are taught Wood-work, and the girls Domestic Economy. Individual pianoforte instruction is optional under Miss Bartholomew, A.L.C.M. Each class is under the care of a responsible Teacher. Standard VII. girls is taught by Miss M. Morrison, L.L.A., and some excellent work was shown in the class. The note-books of the girls were admirably kept, a separate book, both in this class and the others, being used for notes in every subject. Miss Seaward with the 6th girls and Miss Price with the 5th girls are also doing thoroughly good work.

On the boys' side of this department equally good work was going on, Mr. E. Vale having charge of a large 7th Standard, Mr. Hawkins of the 6th, and Mr. Thirlwall of the 5th.

The discipline and order of this department on the day of our visit seemed of a very high order, without there being any rigid repression of the children. All the boys and girls seemed to be thoroughly interested in their work.

In the Organised Science School we find Chemistry—practical and theoretical, Physics—practical and theoretical, Mathematics, Physiology, Hygiene, and Geometry. Our attention is properly directed to the fact that the name 'Science' School only very inade-

ST. GEORGE (BRISTOL) SCHOOL BOARD.

HIGHER GRADE SCHOOL.

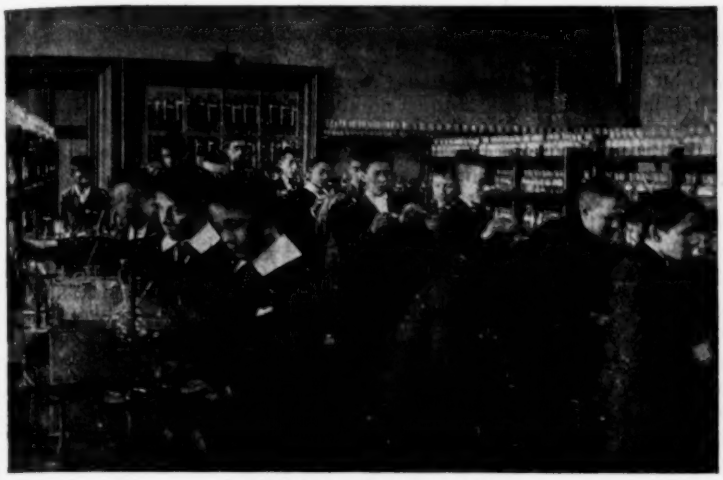
TIME TABLE.

Sex.	Standards.	MORNING. 9—9.30. Prayers and Holy Scriptures.	— Close Registers at 9.45.	9.30 to 10.30. Mental Arithmetic and Arithmetic.	10.30 to 10.45. Recreation.	10.45 to 11.25.	11.25. to 12.	Days.	— Marking Registers (Close at 2.15).	AFTERNOON. 2 to 2.45.	2.45 to 3.15.	3.15 to 3.25. Recreation.	3.25. to 4.	4 to 4.25.	4.25 to 4.30. Prayers and Dismissal.
Boys	VII.					French	Writing	Monday		Euclid or Alge.	Reading		Drawing	Drawing	
	VI.					French	Reading			Euclid or Alge.	Writing		Draw. & Maps	Draw. & Maps	
	V.					Oral Com. or Gr.	Writing			Alge. or Arith.	Reading		Draw. & Maps	Draw. & Maps	
Girls	VII.					Reading	French			Music	Grammar		Writing Comp.	Recitation	
	VI.					Reading	French			Music	Grammar		Writing Comp.	Drill, Writing	
	V.					Geography	Reading			Music	Grammar		Oral Compos.	Elem. Science	
Boys	VII.					French	Reading	Tuesday		Algebra	Writ. Compos.		Grammar	Music	
	VI.					French	Geography			Algebra	Reading		Writing Comp.	Music	
	V.					French or Gram.	Recitation			Algebra	Reading		Writing Comp.	Music	
Girls	VII.					Dom. Economy	Reading			Algebra	Gen. Information		Oral Com. & Gr.	Writing	
	VI.					Geography	Writ. Compos.			Algebra	Reading		Grammar	Elem. Science	
	V.					Grammar	Reading			Arithmetic	Oral Com. & Gr.		Geography	Writing or Drill	
Boys	VII.					Elem. Science	Read. or Recit.	Wednesday		French	Oral Compos.		Grammar	Writing	
	VI.					Ele. Sci. or Gram.	Gen. Information			French	Oral Com. & Gr.		Drill	Geography	
	V.					Oral Compos.	Writing			Arithmetic	Grammar		Geography	Reading	
Girls	VII.					Dom. Economy	Grammar			Needlework	Needlework		French	Drill	
	VI.					Geography	Maps			Needlework	Needlework		French	Read. or Recit.	
	V.					Read. or Recit.	Music			Needlework	Needlework		Geography	Writ. Compos.	
Boys	VII.					Music	French	Thursday		Algebra	Reading		Elem. Science	Drill	
	VI.					Music	French			Algebra	Reading		Grammar	Geography	
	V.					Music	Grammar			Algebra	Reading		Writing Comp.	Geography	
Girls	VII.					French	Reading			Dom. Economy	Writing Comp.		Grammar	Writing	
	VI.					French	Geography			Grammar	Gen. Information		Oral Compos.	Writing or Drill	
	V.					Reading	Writ. Compos.			Grammar	Writing		Gen. Information	Drill or Writing	
Boys	VII.					Elem. Science	Writ. Compos.	Friday		Grammar	Gen. Information		Drawing	Drawing	
	VI.					Writ. Compos.	Read. & Recit.			Grammar	Writing		Drawing	Drawing	
	V.					Writ. Compos.	Drill			Elem. Science or Gen. Inform.	Geography		Drawing	Drawing	
Girls	VII.					Writ. Compos.	Music			Needlework	Needlework		Dom. Eco. or Sci.	French	
	VI.					Music	Geography			Needlework	Needlework		Writing Comp.	French	
	V.					Reading	Grammar			Needlework	Needlework		Geography	Maps	

N.B.—Woodwork—Each day.
Cookery—Mondays, Wednesdays, and Fridays, 10—12 a.m., 2—4 p.m.
Pianoforte—Instruction each day.

Approved, &c. C. LEWIS, Sub-Inspector.

quately describes the work done, as the Humanistic or Literary side is a prominent feature, comprising the following subjects:—French (Grammar and Composition), English, Geography, History, English Literature, Book-keeping, Shorthand, Art Needlework and Dressmaking.



PRACTICAL CHEMISTRY CLASS.
Teacher—MR. T. S. HEPPENSTALL.

The Teachers are all specialists, confining themselves to one or two subjects which they teach to every class. Some excellent work was being done on the day of our visit in the Chemical Laboratory, under the able direction of the Teacher, Mr. T. S. Heppenstall, who, in addition to other qualifications, holds First-class Honours Certificates in Chemistry from South Kensington. The boys were engaged in making hydrogen, and each boy carefully noted the results of his work in a well-kept book, which was checked and corrected by Mr. Heppenstall. In many respects this Chemical Laboratory is the best-equipped room in the building, and it was very gratifying to notice the care which the lads had been taught to exercise in using the somewhat expensive apparatus provided. On another day we found a class of girls having a similar lesson in this room, and they seemed quite as much in earnest as the boys.

The Physical Laboratory is also a good room under the charge of Mr. L. Glyn (Intermediate B.Sc.). Girls were here receiving a lesson on the 'Pressure of the air,' and we were particularly struck with the skill with which Mr. Glyn made the girls themselves deduce the facts he wished them to learn from the ingenious experiments made. Mr. Glyn informed us, in answer to a question, that he thought the girls were quite as much interested as the boys in this scientific work, and seemed to derive quite as much good from it.

We also visited the wood-work room. Here we found Mr. J. W. Watson (Certificated London and City Guilds), the enthusiastic Teacher of this subject, ready to give us any information. The whole of the boys take wood-work both in the Higher Grade and the Organised Science School. Each boy works from drawings made by himself, and we were first shown a pile of drawing-books containing excellent plans and elevations, and then the objects that had been made from these. Some of the inlaid wood-work was among the best that we have ever seen. Some of the boys are making apparatus for their own use in the chemical and physical laboratories, and the work is certainly extremely well done. We were again struck here, as in the laboratories, with the care the lads showed in using the tools and apparatus. Mr. Watson is responsible for the whole of the wood-work done, and also teaches the drawing to the Organised Science School.

The Literary and Commercial work of the Organised Science School, with the French in the Higher Grade School, is in the hands of Mr. W. D. Kempster, who, in addition to being trained (first division), is certificated in Science and Art, and holds the Diploma for French (*Brevet de Capacité*) and Pitman's Teachers' Certificate for Shorthand.

The French is admirably taught on the oral system (*Système Gouin*). A part of each lesson is devoted to conversational exercises, and during this time French only is spoken in the instruction given. The children are much interested in this, and go through the actions of fetching and carrying various objects in the room, opening and closing of doors, windows, &c. They also discuss the state of the weather, enquire after one another's health, and talk about the various places of interest in the neighbourhood, and so on in a very interesting manner.

DRESSMAKING CLASS.
Teacher—MRS. BALHATCHET.

N.B.—Woodwork—Each day.
Cookery—Mondays, Wednesdays, and Fridays, 10—12 a.m., 2—4 p.m.
Pianoforte—Instruction each day.
Approved, &c. C. LEWIS, Sub-Inspector.

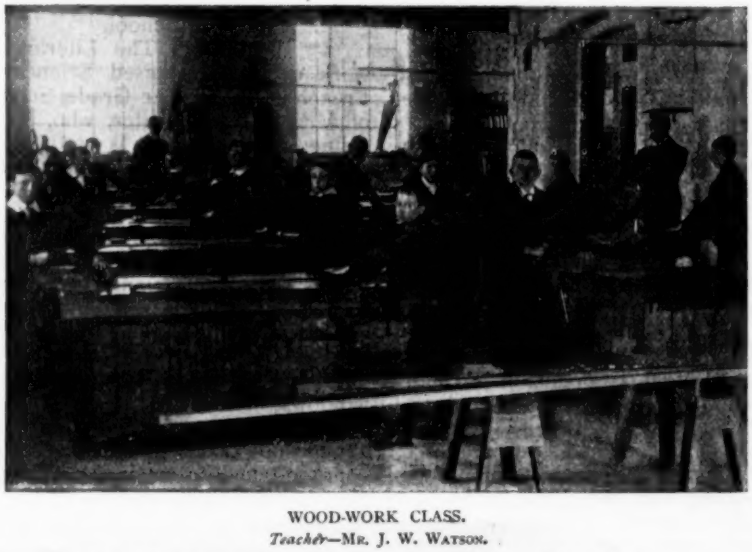
Plenty of practice in 'Unseens' is also given each week from the columns of a French newspaper. On the occasion of our visit an incident occurred which showed how popular a subject the French has become. Twenty lads were undergoing an examination for certificates in Shorthand. After the ordeal there was a general request of 'Please, sir, write us each a postcard in French during the holiday to let us know if we've passed.' We were glad to find later that nineteen such postcards were sent, showing that although Shorthand has only been taught since last September, good progress has been made in this most useful subject.

Miss Wills is the responsible Assistant for the girls in the Organised Science School, and teaches the English subjects together with Physiology and Hygiene. She is specially qualified for these subjects, in addition to being trained and certificated, and is producing some excellent results.

All the girls receive special instruction in Dressmaking, on tailors' principles, from Mrs. Balhatchet (Registered Teacher City and Guilds of London Institute), authoress of 'Dress Cutting and Making'—a very useful manual.

It was our good fortune to see one of these lessons in progress, and the St. George girls are certainly to be congratulated on the advantage they have in being taught by so good a Teacher as Mrs. Balhatchet.

It may easily be gathered that there are many features of this excellent school that we cannot compress into this short article. There are the school sports, in which Mr. Pickles himself takes very special interest. Both boys and girls—separate clubs—have played football and hockey during the past winter, and a cricket club for the coming summer is in course of formation. The School Library is a very excellent one, the funds to establish it having been obtained by a most successful school concert. Magazines and newspapers are also taken for the use of Teachers and scholars. It is worthy of note that although no attendance officer ever enters the school, the children are very regular in their attendance, and the popularity of the school is shown by the short time in which it has become quite full, and the large numbers who compete for the free scholarships.



WOOD-WORK CLASS.
Teacher—MR. J. W. WATSON.

As the school attracts boys and girls from a considerable distance, many walking four or five miles, others cycling longer distances, provision has been made for their dining. The school contains two large dining-rooms, one for boys and the other for girls. Over 150 children have their dinner in school daily.

Neither is the school unoccupied during the evening. Technical Classes are being conducted in Bootmaking, Wood-carving, Book-keeping, Shorthand, Dressmaking, Nursing, Typewriting, Drawing, French, and Chemistry. All these are successful, some of them notably so.

The School Board takes a just pride in the work and development of the school. At the opening ceremony in 1894, the Chairman of the Board, Mr. A. J. Verrier, who presided, said: 'We have brought to the doors of the inhabitants of St. George a really first-class well-equipped school, where the children of the rich, the children of the tradesman, and the children of the poor started from one mark, and, he believed, to the advantage of all. . . . Through scholarships they hoped to form a ladder, beginning at their Elementary Schools through that Higher Grade School, and going right up to the Universities.' The Vice-Chairman of the Board, Mr. J. W. Jones, said recently: 'We have every intention to maintain the school at the highest degree of efficiency, for we are proud of our staff, our scholars, and the school.'

We may well imagine that the School Board in such a comparatively poor district as St. George did not establish the school without having to encounter much opposition, but the steady perseverance of the Chairman, Vice-Chairman, Rev. J. Trebilco, Mr. Bateman, and others, ultimately overcame all obstacles. It should be mentioned that the Technical Committee of the Gloucester County Council made a grant of £200 towards the fitting up of the scientific portion of the school, and it is to be hoped that the same body will see its way clear to still further aid the St. George Board in carrying out the great and noble work it is trying to accomplish in this school. Such a school, to perfectly perform its functions, requires that its Teachers shall be well and generously treated, and that every part of its work shall be helped by the best material and apparatus.

Mr. Pickles has rightly caught the spirit which a director of such an institution should have. We cannot spend an afternoon in his school without being again and again struck with the enthusiasm he has for the work which he has undertaken, and the ability which he brings to bear in working out the details of managing such an important school. He is on excellent terms with the children and the mem-

bers of his staff, and he speaks in the highest terms of the devotion of the latter to their work.

Mr. Pickles takes an active interest in the educational questions before the public. He is anxious to see a greater development of the Higher Grade Schools movement, and a more definite and generous recognition of their position as forming the connecting link between the Elementary School and our University Colleges, and other higher educational institutions. He desires to see all Teachers recognised as belonging to one profession, with a register containing the names of all properly qualified Teachers, without distinction as to the particular grade of school in which they may be engaged. We cannot do better perhaps, than to close this short sketch by thanking the St. George School Board for their courage in erecting such an excellent school, in the doing of which they have shown themselves the pioneers of the Higher Grade School movement in the West; and by quoting, for the profit of all, the motto of the school—

'Palma non sine pulvere.'

LESSONS FOR CRITICISM CLASSES.

BY C. I. DODD, L.L.A.
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LESSON III.

General Aim.—To encourage thought, correct expression, and literary appreciation.

Apparatus.—Map of Switzerland. Blackboard sketch of St. Bernard Pass. Pictures: Glacier, Torrent, Avalanche, Branch of Pine Tree.

Matter.—Stanzas 4, 5, and 6 of the poem.

Time.—50 minutes.

Statement of Aim.—We are going to see what the old man, the maiden, and the peasant said to the youth as he passed through the village.

Questions.—What are we going to learn in this lesson?

Require various children to state the aim in good English, and complete sentences.

I.—*Preparation.*

1. What do you know of the Alpine passes?
2. Describe an Alpine village.
3. Why are the mountains of the Alps covered with snow.
4. Describe the youth who passed through the village.
5. Explain the word 'lowers.'
   A dark sky, threatening a storm.
6. What is a tempest?
   A storm.
7. What is a torrent?
   A wildly-rushing stream.
8. What is a pine tree?
   An evergreen tree.
9. What is an avalanche?
   A mass of snow falling from the tops of the mountains.
10. What time of the year do the avalanches usually occur?
    In Spring, when the snow begins to melt.

Summing up.

Lowers = A frowning sky, threatening a storm.
Tempest = A storm.
Torrent = A wildly-rushing stream.
Pine = An evergreen tree.
Avalanche = A mass of snow falling down the mountain side.

The preparation of the lesson is intended to recall the children's knowledge on the matter about to be discussed, and to clear up difficulties. After various children have suggested meanings for the difficult words of the piece, the teacher must sum up the difficulties by writing the words on the blackboard, and choosing the best definitions given by the scholars.

This summary must be entered in the children's note-books.

II.—*Presentation.*

Matter.	*Development of Matter.*
(*a*) Teacher reads— '"Try not the pass," the old man said; "Dark lowers the tempest overhead, The roaring torrent is deep and wide"; And loud that clarion voice replied, "Excelsior."'	I. 1. Require various children to read this verse with correct expression and emphasis. 2. What does this verse show? (*a*) The old man's warning. (*b*) How the youth replied. (*c*) What he said. Write this summary of the verse on the blackboard.
	II. Who speaks to the youth in the verse? An old man. What does the old man say? 'Try not the pass.' Why does he wish him not to try the pass? Because the sky threatens that a tempest is coming on. Why is it dangerous to cross the mountains in a tempest? There is danger of being lost, and of being blow down a precipice by the storm.
Among the Swiss mountains a storm is heralded by dark gloomy clouds which change the whole scene. The people in villages learn to read the signs of storm.	
Mountain torrents in the Alps often spring from glaciers, and rush wildly down the mountain sides to join the river in the valley. These torrents are often clear and beautifully blue, they dash over the stones, foaming and gurgling. In the Spring, when the snows begin to melt, the torrents grow wide and deep, and are sometimes dangerous.	What other danger did the old man dread? The mountain torrent. Where do the Alpine torrents usually come from? From glaciers. When are the torrents usually swollen and deep? In the Spring, when the snows begin to melt.
The youth replies clearly and firmly 'Excelsior.'	How does the youth receive the old man's warning? He says 'Excelsior' in loud clear tones. What do his clear firm tones show? That he is determined to go on, in spite of all danger.
Inverted commas show that we are quoting somebody else's words.	III. Examine the verse, and point out where the inverted commas are placed. Before 'Try' and after 'pass, and before 'dark' and after 'wide.' What do these inverted commas show? They show the exact words the old man used.
said, overhead } Syllables and spelling irregular. wide, replied } syllables and spelling irregular.	IV. Point out the rhymes in the verse. said, overhead. wide, replied. Examine the rhymes carefully, and comment on them.

Matter.	*Development of Matter.*
	They are not perfect rhymes, because in each case a word of one syllable is put to rhyme with a word of two syllables.
	V. Express this verse in prose.
	The old man said, 'A storm is coming on, for the sky is dark and threatening, and the mountain torrent is swollen and deep, therefore do not try to go over the pass,' but the youth replied in a clear resolute voice, 'Excelsior.'
	Various children must be required to express the verse in prose, when one child fails, another may help her, until a clear well-expressed piece of prose is given.
(*b*) Teacher reads— '"O stay," the maiden said, "and rest Thy weary head upon this breast," A tear stood in his bright blue eye, But still he answered with a sigh, "Excelsior."'	I. 1. Require various children to read until the verse is correctly rendered. 2. What does this verse show? (*a*) What the maiden said to him. (*b*) How he replied. (*c*) What he said.
	II. Who speaks in this verse? The maiden. What does she ask the youth to do? To stay and rest.
The youth is weary before he reaches the Alpine village.	Why is the youth weary? He has probably walked a long way before he reached the village.
	What was the youth's reply? 'Excelsior.' What did he mean by saying 'Excelsior'? He meant that he must be true to the motto he carried and go higher.
	How did he reply? He replied with a sigh and with a tear in his eye.
	Why was he sad? Because he was tired and he wished to stay and rest, but he must go on higher up the mountain.
	III. Point out the rhymes in this verse, and comment on them.
rest } syllables and breast } sound regular. eye } syllables and sigh } sound regular.	rest, breast. eye, sigh.
	They are good rhymes as to sound, but the spelling of each pair of rhymes differs.
	est, east. eye, igh.
	Point out the inverted commas, and say what they show.
	The inverted commas enclose the words spoken by the maiden.

Matter.	*Development of Matter.*
	IV. Express the verse in prose.
	The maiden said to the youth, 'Stay and rest your weary head,' but he replied with a sigh, 'Excelsior.'
(*c*) Teacher reads— '"Beware the pine tree's withered branch! Beware the awful avalanche." This was the peasant's last good-night. A voice replied, far up the height, "Excelsior."'	I. 1. Require various children to read the verse. 2. What does this verse show? (*a*) Peasant's warning. (*b*) Reply from above.
	II. Who speaks in this verse? A peasant. What is a peasant? A man who works in the country. What work does he do? He tills the ground and tends cattle. Of what did the peasant warn him? He warned him of— 1. Pine tree's branches. 2. An avalanche.
Peasant from the Latin *pagus* = country district.	
	What is an avalanche? A mass of snow sliding down the mountain side into the valley.
Avalanche, from the Latin *ad* = to *vallis* = a valley.	Why did the peasant warn him against the avalanche? Because an avalanche often causes great harm by carrying away everything that comes in its way.
In the Spring avalanches occur frequently. The people like to hear the thunder sound of the distant avalanches, for they know that Winter is over and the snows are melting.	What is a pine tree? An evergreen tree, which bears cones. Teacher shows a piece of a pine tree and a cone.
A pine tree is a tall and slender cone-bearing evergreen tree, which often grows on mountain sides. There are several kinds of pines, but they are all alike in having needle-like leaves, and in bearing cones.	Describe the leaves of the pine tree. They are long, narrow, and pointed. (Children must each be given pine leaves to examine.)
	How could a pine tree hurt the youth? The branches might fall upon him in the dark night and kill him.
Storms are often violent among the Swiss mountains. After a storm in the night great stones, trunks and branches of trees, and earth, are carried down the mountain side into the villages by the torrents. Next morning the men and boys assemble and carry away the great stones and branches of trees.	Why were they likely to fall this particular night? Because a storm was coming on, and the pine trees are often blown down in a storm. Describe a scene in a Swiss village after a storm. (A personal experience of a morning after an Alpine storm is best. The writer has a very vivid recollection of such a storm.)
	What reply did the youth make to the peasant's warning? He said 'Excelsior.' Where was he when he said it? Beyond the village, higher up the mountain. What time was it when he entered the village? 'The shades of evening were falling.'

Matter.	*Development of Matter.*
	What time was it when he left it?
	It was night.
	III. Point out the rhymes and comment on them.
branch } syllables avalanche } irregular.	branch, avalanche.
good-night } syllables height } irregular.	good-night, height.
	Both pairs are irregular as to spelling and numbers of syllables.
The hero of a poem or story is the chief person in whose doings we are mainly interested. The minor people are described as characters in the poem or story.	Who is the hero of this poem?
	The youth is the hero.
	Mention the various characters in the poem?
	The old man, the maiden, and the peasant.
	IV. Express this verse in prose.
	'The peasant warned the youth to beware of the pine tree's falling branches, and of the avalanches, but the youth paid no heed, he passed up the mountain, and his voice was heard from above shouting, "Excelsior."'

General Recapitulation.

1. What is the chief thought in these three verses?
   The people in the village try to prevent the youth from going on his journey.
2. What were the dangers they warned him against?
   (1) The threatened tempest.
   (2) The roaring torrent.
   (3) The falling of pine trees.
   (4) The avalanches.
3. What invitation did he receive?
   The maiden begged him to stay and rest himself.
4. Express the whole in prose.
   'An old man in the village street warned the youth that a storm was coming on because the sky looked dark and threatening, and he also said that the mountain's streams were swollen and dangerous, but the young man refused to heed him. A maiden came out from a cheerful cottage and invited the youth to stay and rest. He sighed, for he was very weary, but he was firm in his resolve and he refused. A peasant met him higher up the village and warned him that there was danger in attempting to climb the mountain at night, the pine trees might crash upon him, and the avalanches might sweep him away, but the young man did not heed. He went on his way, and shouted down from above, "Excelsior."'

Children must be required to write a composition on 'The warnings the youth received in the village.'

CLASS TEACHING AND MANAGEMENT.

BY J. GUNN, M.A., D.SC.

WRITING.

Under this heading we have to consider **writing in the narrower sense,** as expressed by the term **penmanship.** In its wider sense the phrase, 'a good writer,' means one who writes good English; but in the sense we have to consider here it only means one who writes a good hand.

We have first to determine **what we mean by a good hand,** or good penmanship; for here, as everywhere else in teaching, our method will depend very much on what we aim at. A clear view of the end will do much to determine the means.

What Good Writing Is.

The most obvious requirement of writing is that it should be **easily read.** But to this we must add that it should be **easily written.** In this busy age we regard writing as one of the useful arts, not as one of the fine arts. The flowing lines and ornamental curves of a past generation have fallen into disuse, to the regret of some, no doubt, but to the substantial advantage of many. Ornamental or artistic effects in penmanship had their value, just as ornamental and artistic effects in printing—illuminated borders and initials, hand-made paper, elaborate bindings, and the like. But these things are luxuries, and lie beyond our province.

Regarding writing then from the point of view of its practical usefulness, second only to actual speech, the first requisite is that it should be easily read. If this were the only requisite, a form of letter like that of our printed character would be the best. But the second requirement is that it should be easily written, and this can be met only by a continuous or current hand. The style we adopt must in some way combine these two requirements.

As to **slope,** something **approaching the vertical** meets both necessities—ease in writing and in reading. A strong case has been made out in favour of writing which is exactly vertical, and many teachers prefer this.

But the term 'vertical' can only apply to the down-strokes, and in current hand only half of our strokes are down-strokes; the upward lines must have a certain slope. It seems therefore a matter of little consequence whether the down-strokes are exactly vertical, or only so near the vertical as to be easily read. In the drawing lesson there is some difficulty in getting lines drawn exactly vertical, due to the relative position of hand and eye. A slight slope is almost sure to be given to the vertical lines; and this slight degree of inclination which comes so natural does not at all detract from the legibility of writing. Vertical writing is apt to degenerate into *back-hand*, which is disagreeable to the eye of most people; and down-strokes which are perfectly vertical are apt to appear as if they sloped backwards, through contrast with the necessary slope of the up-strokes. But there can be no doubt that the slope of 60° formerly used is both less easy to write and less easy to read than the upright styles now common.

The **spacing of letters** in a word, and of words in a line, has an important bearing on legibility. The turn which joins the *u* to the *i* in such a word as *fruit* should certainly be wider than the turn which joins the two parts of the *u*. A reasonable **space between words** is also necessary.

The thickness should not vary too much in the down-strokes and up-strokes. **Fine hair-lines and heavy down-strokes increase the difficulty** of following the form of the writing with the eye. On the other hand, from the natural movements of the hand it is easier to make the down-stroke somewhat thicker than to avoid doing so, as seems to be aimed at in some new models.

There should be **uniformity** of style as to **size, slope,** and other points. The size also should be such as to allow the eye to read easily, and not so large as to waste time in writing.

Neatness, what might even be called elegance, is a material help to legibility, apart from its value otherwise. But this must exclude all ornament, and anything which would lead the attention of a reader from the words to the style. The beauty must arise

from the regularity and firmness of the letters themselves, and not from any added ornament.

Writing Materials.

For beginners in writing, **slates and slate-pencil** are almost universally used. This is no doubt on account of their **cheapness.** The slate does not wear out, and can be used an indefinite number of times. Besides, the letters when badly formed can be readily erased, or partly erased and improved. But for many reasons the slate is a very objectionable thing. The **surface** is hard and unyielding, and disagreeable to handle. Few grown-up people would like to use slates for writing. Then the **ruling** of slates is never satisfactory. Ruling is indispensable as a guide to beginners, and the only serviceable kind of ruling is a grooved line cut into the slate. This forms a trap for the point of the pencil at every turn, and the pupil must either stop short of the line, or have his turns spoilt by the uneven surface he meets there.

The slate was no doubt necessary to avoid expense when paper was a costly material; and probably in many schools it will remain a necessity for the same reason, even with the present low price of paper. But from every other aspect **paper and lead-pencil** are very much more suitable materials for children learning to write. And even the increased cost of the material might be an advantage if it led to more careful superintendence of the exercise. There would be less temptation to set the pupils to do writing merely to keep their fingers out of mischief, as is sometimes done, without much regard being paid to the way in which the writing is performed. As regards the pupil, the knowledge that he could not rub out his blunders would help to make him more careful in observing the form he had to copy. And in such ways as these the writing might gain in quality, though losing somewhat in quantity, by the substitution of paper for slates.

Considerable progress must be made before the lead-pencil or slate-pencil can be laid aside in favour of the pen. For obvious reasons, it is difficult for a child to manage the sharp steel point, and to use ink without disaster befalling his work.

Initiatory Stages.

In its earliest stage **writing does not differ essentially from drawing.** It is a mere imitation of form. Interesting kindergarten exercises may be given on the forms of the printed letters, especially the more regularly shaped capitals, both with stick-laying and drawing. These may be shaded off into a copying of the easier elements and complete forms in our script character. In every case the teacher first draws the form on the blackboard.

But the use of the blackboard does not necessarily supersede the headline in the pupil's own writing-book. The drawing on the board is most useful in showing *how to draw* the form. The headline keeps the pattern close at hand, and shows it on the proper scale.

After a few lessons on strokes, and single and double turns, the letters may be begun. And this will be found more interesting than the mere elements. The letters will not of course be taught in alphabetic order, but in **order of their simplicity of form,** beginning with the easy short letters, such as *i, u, n, m, o, a, c, e,* etc., and afterwards taking up the long letters. Considerable practice should be given and fluency attained before taking up the capitals. Their size, as well as their form, will at first present some difficulty.

Writing Methods.

As for reading, so also for writing, plans and methods have been devised by educational writers and reformers. Some of these have only a historical interest; others are helpful in suggesting points to be studied, even when not adopted in full. Of the former class is **Jacotot's method,** according to which the pupil began not with a single stroke, or a single letter, or even a single word, but with a **sentence.** This was copied first, and then compared with the model, line by line, by the pupil, under the master's care. Afterwards it was done over again, and yet again, until it was perfectly copied, and finally it was done from memory. All this was in small hand; large hand came later.

This method is in many ways the direct opposite of what we now practise, always proceeding from the simpler to the more complex. Yet the method had good results, and seemed to stimulate interest by keeping the children employed on the larger unit, the sentence, rather than the smaller, the letter or its elements.

At the opposite pole stands the famous **Mulhäuser method.** On Mulhäuser's plan the letters were analyzed in a very thorough fashion into their **elements**—straight lines, curved lines, loops, and crotchets, and the joining lines into links and hooks. The letters were then arranged into classes, such as 'right-line and link letters,' 'hook, right-line, and link letters,' and so on. The copy-books were not only ruled horizontally, for the heights of the letters, but diagonally at an angle of 60° as well, so as to give the correct slope and the width of the various letters or parts of letters.

The system as a whole would be found too uninteresting, as all methods are which lay much stress on elements rather than completed wholes; but a study of its details cannot but be helpful, from its minute attention to all the points that go to constitute good writing.

An older method, recommended by **Locke,** but mentioned many centuries before by **Quintilian,** is that of **tracing** the form of the letters, and requiring the pupil to write over this tracing. This plan is followed, in one form or other, in most schools. It is adopted in the early numbers of all engraved copy-books. If such copy-books are not used, pencil tracing by the teacher is usually necessary in addition to the copy set on the blackboard. Nor should this plan be confined to the earlier stages of writing. The teacher may find a pencil tracing very useful for helping backward pupils also at a much later stage, especially those whose eye has a somewhat weak appreciation of form.

The reason for the success of this method is plain. Copying the form of a letter presents two distinct difficulties to a child. There is first the observation of the form to be copied. But there is, in the second place, a worse task—getting the hand to guide the pencil or pen in making the intended form. The training of the hand is more difficult than the training of the eye. The child knows the shape he means to make the letter, but the result is not always what he intended.

When the copy alone is given, say on the blackboard, to be imitated by the pupils, the eye must be regarded as the guide to the hand. The hand is trained through the eye. But when, in addition to this blackboard pattern, given to show *how* the letter should be formed, there is also a faint outline of the letter for the pupil to follow, his hand has a more powerful guide. He has not now to imagine the shape and then make it. He has simply to keep his pencil on the traced lines, and the thing is done. He learns how to make the form by *doing* it rather than by *imagining* it.

Copy-Books.

Much diversity of opinion exists as to the best form of copy-book to use. The question most in debate is, **whether books with engraved headlines** should be used, or **blank books,** the copy being set on the blackboard.

The advantages of setting the copy on the blackboard may be summarised as these :—

1. The whole class is working together, and collective teaching is made possible.
2. Any combination of letters or words may be given which the teacher finds necessary, and difficult points can thus receive fuller attention.
3. It is interesting and instructive for the children to see the copy in the process of being written.

Its disadvantages may be stated thus :—

1. The copy is too distant. To follow it closely is a strain on the sight of all, and too much so for many.
2. This accordingly leads to the pupil copying his own writing after the first line has been written.
3. The distance, and the difference in size, prevent any accurate and detailed comparison of the writing with the pattern.

The *advantages* of the engraved headline are suggested by the *objections* to the blackboard scheme, and its disadvantages by the beneficial points of that scheme, as stated above. The pattern is near, perfectly formed, and admits of easy comparison. The only serious drawback is that a class is often found writing each at a different point in his book, and class-teaching is made impossible.

Since there are admitted advantages in both schemes, it would seem to be wise to **combine the two,** and thus secure all possible aids in teaching. At the same time, such a combination may be found to avoid or remedy the weak points of each separate plan.

Collective Teaching.

Class teaching or collective teaching is certainly indispensable. How, then, can this be secured when using engraved copy-books, seeing that some pupils write more rapidly than others, and that some are certain to be occasionally absent, and so to fall behind the class? The plain answer is—keep the class together in their writing-books exactly as you do in their reading-books. The few fast writers must wait for the main body of the class. Those who have been absent must pass the headline done in their absence, and begin the lesson for the day along with their class-mates. It is surely better that one pupil should leave unused the one-twelfth or one-twenty-fourth of a pennyworth of paper than that the teacher should give up the proper teaching of his class. And if the pupil carries home his book when finished, the blank page or two may serve as an object lesson to those at home, and show by a graphic method what loss is caused by absence in at least one subject of instruction.

Use of the Blackboard.

Supposing, then, that the teacher has taken this very simple means of making collective teaching possible in his writing-books as well as in his other text-books, the lesson will naturally **begin with the blackboard.** For it must be clearly borne in mind that the use of the head-line is not to supersede the demonstration on the blackboard, but to render it more effective. The lesson for the day is first to be looked at, carefully and in detail, under the teacher's guidance. Points of difficulty are to be specially noted, and illustrated on the board. If necessary (as it always is with young pupils), the whole line will be written on the board, so that the children secure the stimulus of interest by seeing the thing done. They then proceed to do it for themselves, but without strain of eye or distraction of attention, for the copy is before them. When one word, or one line—no more—is finished (or it may be only the capital letter at the beginning), the teacher makes a rapid examination of the work of the class or part of the class, and common errors have next to be dealt with on the board, by illustration and correction. The writing is then resumed, but carried no further than the end of the line, or whatever point may be intimated. During the course of the writing the teacher passes round unobtrusively, and has the opportunity of pointing out individual errors. His more backward pupils are of course placed where they can get special supervision.

The use of the lead-pencil by the teacher is helpful, not only for calling attention to weak points, but for the purpose of writing a few letters which are difficult for any pupil, to be traced over in ink by the pupil himself afterwards.

Size of Writing.

For beginners, that size of writing is best which is **large enough for the proper teaching of form, but not too large for the hand to trace easily.** These conditions seem to be best fulfilled by a size fully larger than what is usually known as half-text. The old text-hand, or large-hand, is certainly too large for young children. Small-hand, again, is too small for the effective teaching of form.

When the elements of form are well grasped, and the time comes when the pupil is to make some practical use of his power to write, as in transcription or dictation, a good bold size of small-hand or round-hand should be used. The form of the letter should be the same in both sizes, and only the size should be changed. It is quite useless to teach two forms for *l* or *h*, one for large and the other for small-hand. At this intermediate stage the double ruling of the paper should still be continued, until the difficulty of the altered size has been mastered. But by the time, say, that Standard IV. has been reached, only the single line should be necessary.

Unruled Paper.

When the highest class is reached, writing should be practised on **plain, unruled paper.** This is by no means so common as it should be, but wherever it is done it is of the greatest value. And in this connection it may be mentioned that the size of the writing in the highest classes should be that commonly used in business. Children in the highest standards are taught letter-writing as an introduction to practical life, and as an application of what they learn in school to the actual needs of life. It is absurd that these letters should always he written on ruled foolscap instead of on plain notepaper, such as they will certainly use after leaving school; and it is also absurd that they should use a hand so large that their foolscap page will often hold little more than a business man would write on a post-card. In this, as in every subject of school work, the practical and useful should be kept in view.

(*To be continued.*)

FRENCH PRIMARY SCHOOLS.

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III.

Codes and Inspectors in France.

When a student leaves a training college at the age of eighteen or nineteen, it may chance that he is anxious to take a step higher, and presents himself as a candidate for the examination for entrance to a Higher Normal School, whose function it is to train inspectors and lecturers for Primary Normal Schools. He will have to face the competition of crowds from the colleges and *lycées*. If he is successful he will find himself, if a Parisian, in what remains of the Palace of St. Cloud, and will have its beautiful park as his recreation ground, and the blue Seine as the highway of his dreams. He makes his choice as to whether he is to be a student in the literary or the scientific section, and his work for the next three years is arranged accordingly. The same division holds good for women, and the English visitor who finds his way through a smiling orchard land to Fontenay-aux-Roses, as Matthew Arnold did before him, will be amazed at the scientific knowledge and the practical educational skill of the eighty young ladies who, in that paradise of green lawns and bright blossoms, have entered into a bond to serve for at least ten years the State which maintains them there. Yet are they merry as well as hard-working, and disdain not frequent dancing; they realise the dream of 'The Princess,' save that man comes from scarce-seen Paris to shower his elder wisdom upon these eager enquirers. Each student has her little plot of garden, too, which the scientific student makes a botanic garden in miniature, prim and precise, while her literary sister affects the sentimentalities of horticulture, and prunes the rose or trains the waving convolvulus. But for the men at St. Cloud there is no garden, though they may unbend to agricultural delights.

The heads of both colleges are men whose place is in the front rank of French thought. The Principal of Fontenay-aux-Roses, M. Pécant, is famed for a knowledge of the educational systems of all Europe, so wide as to be almost unrivalled, and an equally broad knowledge of the various schools of philosophical and educational thought in Britain. The most distinguished professors from the Sorbonne visit both colleges, and the lectures on education are given by Professor Marion, than whom no living man throws more penetrating light on many educational problems, and whose books are too little known in England. A three years' course under such auspices guarantees a high degree of mental training in those who pass the exit examination.

Many of these proceed to teach as professors in the lower training colleges. But they may go further and aim at the Inspectorate. The obtaining of a post as Inspector of Primary Schools is in France dependent upon passing a certain examination. The greatest number of those who present themselves for this have passed through their course in the Higher Normal Colleges of which we have spoken. But to the examination there may, and do, come forward as candidates head masters and head mistresses of Primary Schools. Let it be always borne in mind that there are women-inspectors as well as men-inspectors in France. The ordinary *instituteurs* may not enter for the examination however, only the *directeur* (head master). The trained students of the Higher Normal Schools, no doubt, gain the coveted certificate more readily than these latter candidates, and, because of this, it has been of late suggested that the nominations to the Inspectorate should be divided in a fixed proportion between the two classes. But, from whatever class they come, it is thus evident that French Inspectors have studied deeply and long the subjects of the schools they purpose inspecting, that they have undergone elaborate and systematic training and practice in teaching, and have acquired a comprehensive knowledge of what France and other lands have thought, imagined, and done in the great task of education. So equipped, they are not unfitted to become the guides, counsellors, and friends of the teachers in their carrying out of the provisions of the Codes.

French Codes (*plans d'étude, programmes d'enseignement*) are somewhat different from the British species. They are much less technical, and the meaning of all their articles is plain to the lay mind. Yet they are wider than ours, for they concern themselves with many matters other than the subjects of instruction. They define very closely the duties of the teacher, they require the re-vaccination of every child at ten years of age, they insist on details of ventilation, they forbid theatrical representations in school and all subscriptions for any purpose whatever, or the receiving of presents by teachers. They fix the work to be done in the various subjects month by month, they suggest to what subjects tasks (*devoirs*) should be affixed, and they prescribe methods of correcting them, and so on. They seem thus to unduly limit a teacher's action. Yet one cannot feel so after reading the directions which are 'to serve for the understanding and the applying of the Codes.' To every section of the work which the Code ordains there are annexed paragraphs which treat of the purpose of that subject as a factor in education, and which suggest methods of meeting difficulties, which may be as beacons to the teacher who studies them. Special directions are given for the benefit of a teacher who may find himself in sole charge of a school. It may be said that the place for all this instruction is in the training College. No doubt, but the successful teacher can never afford to 'drop' the literature of education, and it is to be feared that most of us do so. Still further, there is annexed to the Code what can only be termed a study in the Theory of Education, and a treatise *De Emendatione Intellectus*, which is fortified by frequent references to Montaigne, Fénélon, Pascal, Pestalozzi, and other heroes of the educational faith. Perhaps this does not accomplish all the good its promoters intend, but it testifies to a sincerity of intention that is likely to be of benefit in stimulating that zeal which is the not rare endowment of teachers in all lands.

CONVERSATIONAL LESSONS IN CHEMISTRY.

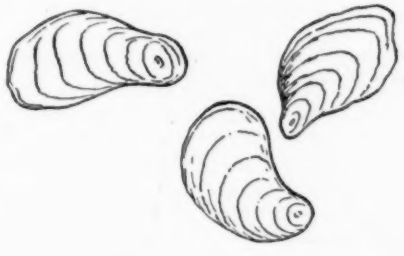
BY THOMAS CARTWRIGHT, B.A., B.SC. (LOND.),

First Class Honoursman in Chemistry, S. and A. Department, Lecturer in Chemistry to the Middlesex County Council, Late Lecturer in Physiography to the Birkbeck Institution, Chancery Lane, E.C.

For particulars of the List of Chemicals and PRACTICAL TEACHER Set of Apparatus for working the experiments referred to in these lessons see numbers for January and February 1893.

LESSON XXXI.—STARCH.

IN our last lesson we mentioned that the *starch* which forms so large a proportion of our food *has to be turned into a kind of sugar* before it can pass into the blood stream. To-day we are to examine this substance—starch—and I think I can answer for it that you will find the study far from uninteresting. In the first place I want all of you to look at the starch which is on the slide under my microscope. What does it look like, Lilla? All I can see, sir, is some circular lines running parallel to each other. That is all I expected you to see. They are the marks on the starch grains. Here is some starch



which I want you, Tom, to powder, and then to place it in water. Does it dissolve? No, sir; it is *insoluble in water*. Quite so; and now let us boil the starch. See, on cooling, it *forms a kind of jelly*. The reason for this is that each grain is enclosed in a thin coat, which is not burst when the starch is placed in cold water, but which **bursts when the grain swells** upon heating. Now pour the boiled mixture upon a filter paper. A liquid, you notice, comes slowly through the paper, and it is easy to show that there is a small quantity of starch dissolved in the water. How, Trixie? *By evaporating the solution, sir*. Yes, that is one way, but there is a better one. This bottle contains a **solution of iodine.** See how the colour changes when the liquid passes into the starch. What colour is the iodine solution now, Frank? It is **blue,** sir. Quite so; and this is the easy test for starch. Try it on a solid substance, George. See what **a deep indigo blue the white starch turns** to. *Boil* the blue solution again, Maud. The *blue colour has gone, sir*. Quite true, but it will return as soon as the liquid shall again become cool. We have already said that there is *much starch in vegetables*, indeed it is the substance starch that is mainly produced in the plant factory from the carbon of the atmospheric carbon dioxide. You can all understand now why we *boil vegetables*. You tell us why, Harry. It is *to break the starch grains* up, sir, and make the starch soluble. Yes, for *only soluble substances are good for food*. I need hardly tell you the source of our starch after what has just been said. Let Minnie reply. From vegetables, sir. Yes, we get our main supplies from **rice, potatoes,** and **maize.** Take this potato, George, cut it in halves, and rub the two halves together under the running tap; at the same time let Annie pour some water on this little bag of flour. The sediment which is found in each case is starch, as will be readily seen by the iodine test. Now put some starch in a boiling tube, and raise the temperature much higher than when we merely dissolved some of it. Add a drop of HCl to the liquid in order to bring about the change more quickly. If we pour some iodine solution into the liquid now we shall have no blue coloration but **a red one,** thus proving that starch is no longer present. You show us, Isabel, that this is true. Now bring a small paint brush and a piece of paper, over which I will smear some of the new product. See how well *it answers the purpose of gum*. It is called on this account **British gum, or dextrine.** What is it, Maud? Is it not this substance which makes paste stick? Exactly, since there is starch in flour, and we boil to make paste, there can be little doubt but that we produce *dextrine*, which is the *sticky part of paste*. Let us next produce another important modification of starch. To bring this about Tom shall *make a weak solution of sulphuric acid in which some starch is to be boiled* for 10 or 15 minutes. Pour some iodine solution into this, and observe that there is no change whatever, so that neither starch nor dextrine is now present. If you evaporate to dryness you will get a substance exactly like this specimen, which I want you to taste. Why, it is sugar, sir. Quite true. **The starch has been turned into glucose, or grape sugar,** just as is the case when starch is acted upon by the saliva. Is there sulphuric acid in the saliva then, sir. No, Minnie, there is not, but there is *a substance called a ferment which can also change starch into soluble sugar*. This is what happens when a seed is germinating, as can be readily proved by referring to *malt*. What is malt made from, Lizzie? From barley, sir. Very true, and in this way. *The barley is heated to make it sprout, and at the same time a substance called diastase is produced.* This *diastase is a ferment,* and it acts upon the starch which is contained in the seeds, and converts it into glucose or grape sugar. This is just what the maltster wants, for, although *alcohol cannot be made from starch*, it can very readily be made from glucose, so that malting is just like starch digestion. In the tubers of the dahlia and of the Jerusalem artichoke there are to be found little tiny grains closely resembling starch granules, called inulin. Here is a specimen of the starch-like **inulin** which I obtained by reducing the tubers of a dahlia to pulp and by treating the pulp with water in a sieve. Let Mabel now place some of the inulin grains into water and boil. Notice that *the grains dissolve*, as they are *much more soluble in warm water than the starch grains*. You, Maud, shall now apply the iodine test. There is *no coloration*, sir. Exactly; and that is not the only difference between starch and inulin; for, although inulin is *turned into a kind of sugar* when boiled with sulphuric acid, it is *not glucose* that results, but another species of sugar known as **levulose.** Well, Trixie, what is your question? Is *gum* a kind of starch? No, my child; but **the gum very closely resembles** starch, as does also the substance which forms the cell-wall of the starch grains, the name given to which is **cellulose.** I told you that sugar consists of carbon, oxygen, and hydrogen, and that the O and H are present in the proportion of two atoms of H to one atom of O. Starch also consists of CO and H, and again the proportion between the O and the H is that which obtains in water, so that starch also is a carbohydrate.

Now let us in conclusion sum up the results of our lesson. Starch is **found in all plants.** It is *chiefly prepared from* **potatoes, rice,** and **maize** by crushing in a stream of water. The insoluble starch collects at the bottom of the vessel.

When heated, the starch grains burst, and some of the starch dissolves. *At about* 100° *C.* **dextrine or British gum** *is formed.* At a higher temperature, when **boiled in** H_2SO_4, **glucose is formed.**

This soluble substance is also *formed by the action of ferments, as in mastication and in malting.* Starch is a **carbohydrate,** *i.e.*, it consists of COH, the O and H being in the proportion that forms water.

Inulin, gums, and **cellulose** are *very similar* both in composition and in properties to starch.

COURSE 'B' IN ARITHMETIC.

A COMPLETE SYLLABUS FOR A YEAR, IN MONTHLY SECTIONS, WITH TESTS.

BY B. ELDERKIN,
Model School, Westminster Training College.

For Introductory Notice and First Month see February number of PRACTICAL TEACHER.

STANDARD I.

Syllabus—4th Month.

(*a*) Addition and Subtraction of numbers up to 60.
(*b*) Five times table.
(*c*) Multiplication by 2, 3, 4 up to 60.
(*d*) Division by 3 up to 36.

Test.

1. There are 17 children in first class, 21 in the second, 13 in the third, and 19 in the fourth; how many children are there in the school?
2. How many more are 54 than 39?
3. If there are 18 boys in one class, how many would there be in 4 classes?
4. How many threes are there in
   36 =
   19 =
   27 =
   23 =
   14 =

STANDARD II.

Syllabus—4th Month.

(*a*) Four rules up to £1.
(*b*) Ten times table.

Test.

1. A coat costs 8s. 6d.; a vest 2s. 9d.; and trousers 7s. 11d.; how much does the suit cost?
2. How much more does the coat cost than the vest?
3. Multiply 2s. 10½d. by 6.
4. Three boys' suits cost 19s. 6d.; what would one suit cost?

STANDARD III.

Syllabus—4th Month.

(*a*) Simple and Compound Multiplication and Division by 22, 32, 42, etc.
(*b*) Simple Addition and Subtraction in four figures.
No answer to exceed £40.

Test.

1. How many are 740 sheep, 839 sheep, 706 sheep, 79 sheep, and 568 sheep?
2. Find the cost of 52 chairs at 17s. 6d. each.
3. Divide £38 5s. 0d. by 72.
4. How many oranges are 82 times 950 oranges?

STANDARD IV.

Syllabus—4th Month.

(*a*) Revise Compound Addition and Subtraction.
(*b*) Four rules in 'Time Measure.'

Test.

1. Add together 15 dys. 13 hrs. 25 min.; 29 dys. 24 min. 13 sec.; 28 dys. 16 hrs. 12 mins.; 13 dys. 16 hrs. 28 sec.
2. A horse did a journey in 4 hrs. 19 min. 35 sec., which a train did in 1 hr. 25 min. 40 sec.; how much quicker was the train?
3. (*a*) Change 3 hrs. 59 min. 38 sec. into seconds, and (*b*) 5,189 hours into weeks.
4. Add together £25 13s. 9½d.; £16 8s. 5¼d.; £5 18s. 8¾d.; £46 12s. 6d.; £24 13s. 9½d.

STANDARD V.

Syllabus—4th Month.

(*a*) Reduction of Fractions.
(*b*) Concrete Fractions.
(*c*) Reduction in Avoirdupois Weight.

Test.

1. $\frac{1}{3}$ of 10s. 6d. + $\frac{5}{8}$ of £2 12s. 4d. + $\frac{7}{12}$ of £5 15s. — $\frac{2}{3}$ of 12s. 6d.
2. Express $\frac{4}{5}$ of 7 cwt. 2 qrs. as the fraction of half a ton.
3. How many lbs. of tea could I weigh from a chest containing 3 tons 19 lbs.?
4. $15\frac{1}{2} \div (7\frac{1}{4} - 5\frac{1}{8})$.

STANDARD VI.

Syllabus—4th Month.

Simple Proportion (no Fractions or Decimals).

Test.

1. If 5 tons 12 cwt. of sugar cost £56, how much should I pay for 3 tons 15 cwt.?
2. If I purchase 51 yds. for £1 16s., how many yds. could I get for £19?
3. A bankrupt can only pay his creditors 15s. 6d. in the pound; how much would a creditor lose to whom he owed £56?
4. Simplify—

$$\frac{(300 - 5{\cdot}85) \times (5{\cdot}14 + {\cdot}06)}{47{\cdot}3}$$

STANDARD VII.

Syllabus—4th Month.

Percentages:—
(*a*) Uses of term per cent.
(*b*) To express simple percentages as fractions of 100.
(*c*) Find the percentage one simple number is of another.
(*d*) To reduce or increase quantities by so much per cent.

Test.

1. What fraction of a number is equivalent to 2%, 2½%, 4%, 5% and 12½% respectively?
2. How much per cent. is—
   £15 out of £25?
   20s. ,, £50?
   14s. ,, £90?
3. What is—
   5% of £135 10s.?
   2½% of 3 tons 15 cwt.?
   7½% of 7,600?
4. If the population of London were 3,500,000, find its population when it has increased by 12½ per cent.?

TESTS—FOURTH MONTH ANSWERS.

Standard I.—(1) 70; (2) 15; (3) 72; (4) 12, 13, 9, 7 + 2, 4 + 2.
Standard II.—(1) 19s. 2d.; (2) 5s. 9d.; (3) 17s. 3d.; (4) 6s. 6d.
Standard III.—(1) 2,932; (2) £45 10s.; (3) 10s. 7½d.; (4) 77,900.
Standard IV.—(1) 86 d. 22 h. 1 m. 41 sec.; (2) 2 h. 53 m. 55 sec.; (3) (*a*) 14378 sec.; (*b*) 30 wks. 6 dys. 5 hrs.; (4) £119 7s. 2¾d.
Standard V.—(1) £5 5s. 4d.; (2) $\frac{8}{9}$; (3) 6,739 lbs.; (4) $7\frac{5}{17}$.
Standard VI.—(1) £37 10s.; (2) 538½ yds.; (3) £12 12s.; (4) 32·3378.
Standard VII.—(1) $\frac{1}{20}$, $\frac{1}{40}$, $\frac{1}{25}$, $\frac{7}{20}$, $\frac{1}{8}$; (2) 60%, 2%, $15\frac{5}{7}$%; (3) £6 15s. 6d.; 1 cwt. 3 qrs. 14 lbs.; 570; (4) 3,937,500.

FIRST INSPECTION UNDER ART. 84B.

FIVE AND A HALF MONTHS OF THE SCHOOL YEAR HAD ELAPSED.

THE Head Inspector came at 9.35, and stayed until 12.15. He returned at 1.55, and stayed until 4.20.

He examined Standards II., IV., V., VI., and VII., and the work was taken from the syllabus book.

All the sums were dictated, and seemed to be composed on the spur of the moment.

Standard IV. did their sums and dictated words on paper, whereas all the others worked on slates.

The Inspector asked full particulars respecting the monthly examinations by the head teacher, and was pleased to hear that merit lists of the examinations in the elementary subjects were made for all Standards.

He made copious notes, and recorded the number who got the sum correct and the number wrong in each class examined.

He promised to give us another call shortly, and, if the report is as good as those received under the old system, the new style of inspection will be hailed with great satisfaction by all the teachers in this department.

Arithmetic.

STANDARDS VI. AND VII.

H.M.I. divided the class in four parts by means of numbers 1, 2, 3, 4, and gave one sum to each boy. One sum was given to Standards VI. and VII., as No. 4.

Standard VII. :—

1. The 10 per cents. are at 50. What annual income do I get by investing 10 pence? Ans. 2d.

2. Average age of A and B is 100 years. B is a week old. Find A's age. Ans. 199 yrs. 51 wks.

3. Population on January 1st is 120. In one year 10 are are born and 7 die. What is the percentage of increase?
Ans. 2½ per cent.

Standards VI. and VII. :—

4. A handkerchief is 18″ by 18″. How many would cover a table 9′ by 9′? Ans. 36 handkerchiefs.

Standard VI. :—

1. Numerator ½, denominator ⅔. What fraction of an hour?
Ans. 45 mins.

2. A's answer 2·567; B's 2·568. Correct answer 2·5676. Who made the bigger mistake, and by how much?
Ans. A by ·0002.

3. (*a*) 1001 ÷ ·001001.

(*b*) ·001001 ÷ 1001.

Ans. (*a*) 1,000,000; (*b*) ·000001.

H.M.I. questioned closely on methods employed, and asked teacher to show both classes the one about the answers (No. 2 in Standard VI.), insisting on boys telling the teacher everything, and giving words necessary to write on blackboard to show the several steps. He was particular in having the decimal point given its full name, *decimal point*, not decimal.

The mental questions were on cubic measure as applied to cubes. Number of small cubes required to make a larger? He asked what number of sides a cube had, number of corners, and number of edges?

Repetition.

In this subject Standards V., VI., and VII. were taken together. On asking how much had been prepared, H.M.I. took the card and asked the first boy to proceed. He heard about six lines, and then questioned that boy on the meanings and allusions.

Inverted phrases he asked to be re-arranged, and in one case where the word 'obscurèd' occurred he asked the reason for it; and on being told 'to make up the correct number of syllables in the line,' he asked what they were called in poetry, and was rather pleased to be answered correctly. To correct and distinct articulation he paid great attention, and several times required boys to repeat a line he had doubts about.

The Inspector gave Standards VI. and VII. the following arithmetical question, and said he would ask for the answer on his next visit :—

In an army 5 out of every 6 were Irishmen. In a battle one out of every 5 was killed. Find the least fraction of Irishmen killed.

STANDARD V.

The Inspector entered the room a little before 2 o'clock, and watched the boys take their places.

Questioned teacher as to what Arithmetic had been done, and asked for Progress Book. The class was then divided into four divisions, and a sum given to each division.

1. 500 at 19s. 11½d. each. Ans. £498 19s. 2d.

2. 2 cwt. 2 qrs. 1 st. at £70 a ton. Ans. £9 3s. 9d.

3. How many square yards in a square mile?
Ans. 3,097,600 sq. yds.

4. A has a start of 1 hour, and walks 3 miles an hour B overtakes A when A has gone 12 miles. How fast does B walk? Ans. 4 miles per hour.

When the answer to the first sum was taken, the boys who had worked it £500 minus 500 halfpence were told that was the proper way.

The method of working the third sum was also asked.

After the answer to the fourth sum had been taken, the teacher was asked to work the sum on the blackboard. H.M.I. required everything written on the board to be obtained from the class, and himself made remarks on the working. The boys were asked to write about a concert, but the work was not examined.

STANDARD IV.

Gave the boys numbers 1, 2, 3, 4. Wrote four sums on the blackboard. Boys had to work the one to which their number was opposite.

1. How much is 199 times 13s. 4½d.?
Ans. £133 1s. 7½d.

(Complimented those who took 200 — 1 as their factors.)

2. How many geese can you buy with £3 3s. 6d. at 1s. 4d. each? Ans. 47 geese and 10d. over.

(Wanted the reason for the query mark.)

3. The wheels of 100 carts and 110 wagons cost £80 5s. 4d.; what was the cost per wheel? Ans. 2s. 6d. and 64d. over.

4. If 8 pennies make 1 shilling, and 10 shillings make 1 pound, what will be the share of each of 3 men if £2 be divided among them equally? Ans. 6s. 5⅓d.

He worked the sums himself, and called out the answers. He then looked at those wrong to see how near they were to the correct answer.

While the sums were being worked samples of Standard V. readers were borrowed, and one boy was asked to read. He was quite satisfied and asked no one else.

As the last sum proved too much, the teacher was asked to work it out on the blackboard, and to reckon 5 farthings for a penny.

The following questions were then asked :—

$$4 \div 2 = 2.$$

$$4 \text{ eggs} \div 2 = 2 \text{ eggs}.$$

$$4 \text{ eggs} \div 2 \text{ eggs} = 2.$$

Some of the boys said the last one could not be done, so he demonstrated it in the following manner :—

$$\text{Smith} = \text{A} \times \text{B}.$$

A boy was told to read that.

Smith divided by A was asked. Ans. B.

" " B " Ans. A.

Instead of Smith put 4 eggs, instead of A × B put 2 eggs × 2.

$$\text{Smith} \div \text{A} = \text{B};$$

$$\therefore 4 \text{ eggs} \div 2 \text{ eggs} = 2.$$

Poetry was then taken, and great care was taken over the enunciation, and making rapid talkers go over it again and again until it became slower. Questions were asked by Inspector on the meanings.

Word-building and Dictation were taken. He dictated the following sentences and the boys repeated them. Then the words in italics were written :—

1. *I'm as* good as you are.
2. *Where were* you yesterday?
3. I can eat the *whole* of a plum pudding.
4. I am *quite* well.
5. January, *February*, March.

The word *advise* was taken from the spelling-book, and the boys were told to write three words from it.

The word *adviser* was taken, and the boys told to make sentences containing it.

The word *conquer* was used in the same way.

The copy-books were gone through carefully.

STANDARD II.

Inspector had the class divided into 4 divisions—1, 2, 3, and 4. Each division worked one sum.

1. There were 20,000 pigs in a field. A thief came and stole 11. How many were left? Ans. 19,989 pigs.

2. If there were 25 cherries on a cherry tree, how many cherries would there be on 198 trees?
Ans. 4,950 cherries.

FRENCH PRIMARY SCHOOLS.

BY STEWART A. ROBERTSON, M.A.,
English Master, Stirling High School.

III.

Codes and Inspectors in France.

When a student leaves a training college at the age of eighteen or nineteen, it may chance that he is anxious to take a step higher, and presents himself as a candidate for the examination for entrance to a Higher Normal School, whose function it is to train inspectors and lecturers for Primary Normal Schools. He will have to face the competition of crowds from the colleges and *lycées*. If he is successful he will find himself, if a Parisian, in what remains of the Palace of St. Cloud, and will have its beautiful park as his recreation ground, and the blue Seine as the highway of his dreams. He makes his choice as to whether he is to be a student in the literary or the scientific section, and his work for the next three years is arranged accordingly. The same division holds good for women, and the English visitor who finds his way through a smiling orchard land to Fontenay-aux-Roses, as Matthew Arnold did before him, will be amazed at the scientific knowledge and the practical educational skill of the eighty young ladies who, in that paradise of green lawns and bright blossoms, have entered into a bond to serve for at least ten years the State which maintains them there. Yet are they merry as well as hard-working, and disdain not frequent dancing; they realise the dream of 'The Princess,' save that man comes from scarce-seen Paris to shower his elder wisdom upon these eager enquirers. Each student has her little plot of garden, too, which the scientific student makes a botanic garden in miniature, prim and precise, while her literary sister affects the sentimentalities of horticulture, and prunes the rose or trains the waving convolvulus. But for the men at St. Cloud there is no garden, though they may unbend to agricultural delights.

The heads of both colleges are men whose place is in the front rank of French thought. The Principal of Fontenay-aux-Roses, M. Pécant, is famed for a knowledge of the educational systems of all Europe, so wide as to be almost unrivalled, and an equally broad knowledge of the various schools of philosophical and educational thought in Britain. The most distinguished professors from the Sorbonne visit both colleges, and the lectures on education are given by Professor Marion, than whom no living man throws more penetrating light on many educational problems, and whose books are too little known in England. A three years' course under such auspices guarantees a high degree of mental training in those who pass the exit examination.

Many of these proceed to teach as professors in the lower training colleges. But they may go further and aim at the Inspectorate. The obtaining of a post as Inspector of Primary Schools is in France dependent upon passing a certain examination. The greatest number of those who present themselves for this have passed through their course in the Higher Normal Colleges of which we have spoken. But to the examination there may, and do, come forward as candidates head masters and head mistresses of Primary Schools. Let it be always borne in mind that there are women-inspectors as well as men-inspectors in France. The ordinary *instituteurs* may not enter for the examination however, only the *directeur* (head master). The trained students of the Higher Normal Schools, no doubt, gain the coveted certificate more readily than these latter candidates, and, because of this, it has been of late suggested that the nominations to the Inspectorate should be divided in a fixed proportion between the two classes. But, from whatever class they come, it is thus evident that French Inspectors have studied deeply and long the subjects of the schools they purpose inspecting, that they have undergone elaborate and systematic training and practice in teaching, and have acquired a comprehensive knowledge of what France and other lands have thought, imagined, and done in the great task of education. So equipped, they are not unfitted to become the guides, counsellors, and friends of the teachers in their carrying out of the provisions of the Codes.

French Codes (*plans d'étude, programmes d'enseignement*) are somewhat different from the British species. They are much less technical, and the meaning of all their articles is plain to the lay mind. Yet they are wider than ours, for they concern themselves with many matters other than the subjects of instruction. They define very closely the duties of the teacher, they require the re-vaccination of every child at ten years of age, they insist on details of ventilation, they forbid theatrical representations in school and all subscriptions for any purpose whatever, or the receiving of presents by teachers. They fix the work to be done in the various subjects month by month, they suggest to what subjects tasks (*devoirs*) should be affixed, and they prescribe methods of correcting them, and so on. They seem thus to unduly limit a teacher's action. Yet one cannot feel so after reading the directions which are 'to serve for the understanding and the applying of the Codes.' To every section of the work which the Code ordains there are annexed paragraphs which treat of the purpose of that subject as a factor in education, and which suggest methods of meeting difficulties, which may be as beacons to the teacher who studies them. Special directions are given for the benefit of a teacher who may find himself in sole charge of a school. It may be said that the place for all this instruction is in the training College. No doubt, but the successful teacher can never afford to 'drop' the literature of education, and it is to be feared that most of us do so. Still further, there is annexed to the Code what can only be termed a study in the Theory of Education, and a treatise *De Emendatione Intellectus*, which is fortified by frequent references to Montaigne, Fénélon, Pascal, Pestalozzi, and other heroes of the educational faith. Perhaps this does not accomplish all the good its promoters intend, but it testifies to a sincerity of intention that is likely to be of benefit in stimulating that zeal which is the not rare endowment of teachers in all lands.

CONVERSATIONAL LESSONS IN CHEMISTRY.

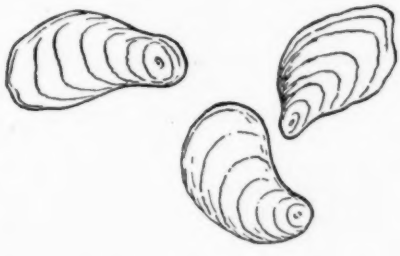
BY THOMAS CARTWRIGHT, B.A., B.SC. (LOND.),

First Class Honoursman in Chemistry, S. and A. Department, Lecturer in Chemistry to the Middlesex County Council, Late Lecturer in Physiography to the Birkbeck Institution, Chancery Lane, E.C.

For particulars of the List of Chemicals and PRACTICAL TEACHER Set of Apparatus for working the experiments referred to in these lessons see numbers for January and February 1893.

LESSON XXXI.—STARCH.

IN our last lesson we mentioned that the *starch* which forms so large a proportion of our food *has to be turned into a kind of sugar* before it can pass into the blood stream. To-day we are to examine this substance—starch—and I think I can answer for it that you will find the study far from uninteresting. In the first place I want all of you to look at the starch which is on the slide under my microscope. What does it look like, Lilla? All I can see, sir, is some circular lines running parallel to each other. That is all I expected you to see. They are the marks on the starch grains. Here is some starch



which I want you, Tom, to powder, and then to place it in water. Does it dissolve? No, sir; it is *insoluble in water*. Quite so; and now let us boil the starch. See, on cooling, it *forms a kind of jelly*. The reason for this is that each grain is enclosed in a thin coat, which is not burst when the starch is placed in cold water, but which **bursts when the grain swells** upon heating. Now pour the boiled mixture upon a filter paper. A liquid, you notice, comes slowly through the paper, and it is easy to show that there is a small quantity of starch dissolved in the water. How, Trixie? *By evaporating the solution, sir*. Yes, that is one way, but there is a better one. This bottle contains a **solution of iodine.** See how the colour changes when the liquid passes into the starch. What colour is the iodine solution now, Frank? It is **blue,** sir. Quite so; and this is the easy test for starch. Try it on a solid substance, George. See what **a deep indigo blue the white starch turns** to. *Boil* the blue solution again, Maud. The *blue colour has gone, sir*. Quite true, but it will return as soon as the liquid shall again become cool. We have already said that there is *much starch in vegetables*, indeed it is the substance starch that is mainly produced in the plant factory from the carbon of the atmospheric carbon dioxide. You can all understand now why we *boil vegetables*. You tell us why, Harry. It is *to break the starch grains* up, sir, and make the starch soluble. Yes, for *only soluble substances are good for food*. I need hardly tell you the source of our starch after what has just been said. Let Minnie reply. From vegetables, sir. Yes, we get our main supplies from **rice, potatoes,** and **maize.** Take this potato, George, cut it in halves, and rub the two halves together under the running tap; at the same time let Annie pour some water on this little bag of flour. The sediment which is found in each case is starch, as will be readily seen by the iodine test. Now put some starch in a boiling tube, and raise the temperature much higher than when we merely dissolved some of it. Add a drop of HCl to the liquid in order to bring about the change more quickly. If we pour some iodine solution into the liquid now we shall have no blue coloration but **a red one,** thus proving that starch is no longer present. You show us, Isabel, that this is true. Now bring a small paint brush and a piece of paper, over which I will smear some of the new product. See how well *it answers the purpose of gum*. It is called on this account **British gum, or dextrine.** What is it, Maud? Is it not this substance which makes paste stick? Exactly, since there is starch in flour, and we boil to make paste, there can be little doubt but that we produce *dextrine*, which is the *sticky part of paste*. Let us next produce another important modification of starch. To bring this about Tom shall *make a weak solution of sulphuric acid in which some starch is to be boiled* for 10 or 15 minutes. Pour some iodine solution into this, and observe that there is no change whatever, so that neither starch nor dextrine is now present. If you evaporate to dryness you will get a substance exactly like this specimen, which I want you to taste. Why, it is sugar, sir. Quite true. **The starch has been turned into glucose, or grape sugar,** just as is the case when starch is acted upon by the saliva. Is there sulphuric acid in the saliva then, sir. No, Minnie, there is not, but there is *a substance called a ferment which can also change starch into soluble sugar*. This is what happens when a seed is germinating, as can be readily proved by referring to *malt*. What is malt made from, Lizzie? From barley, sir. Very true, and in this way. *The barley is heated to make it sprout, and at the same time a substance called diastase is produced.* This *diastase is a ferment*, and it acts upon the starch which is contained in the seeds, and converts it into glucose or grape sugar. This is just what the maltster wants, for, although *alcohol cannot be made from starch*, it can very readily be made from glucose, so that malting is just like starch digestion. In the tubers of the dahlia and of the Jerusalem artichoke there are to be found little tiny grains closely resembling starch granules, called inulin. Here is a specimen of the starch-like **inulin** which I obtained by reducing the tubers of a dahlia to pulp and by treating the pulp with water in a sieve. Let Mabel now place some of the inulin grains into water and boil. Notice that *the grains dissolve*, as they are *much more soluble in warm water than the starch grains*. You, Maud, shall now apply the iodine test. There is *no coloration*, sir. Exactly; and that is not the only difference between starch and inulin; for, although inulin is *turned into a kind of sugar* when boiled with sulphuric acid, it is *not glucose* that results, but another species of sugar known as **levulose.** Well, Trixie, what is your question? Is *gum* a kind of starch? No, my child; but **the gum very closely resembles** starch, as does also the substance which forms the cell-wall of the starch grains, the name given to which is **cellulose.** I told you that sugar consists of carbon, oxygen, and hydrogen, and that the O and H are present in the proportion of two atoms of H to one atom of O. Starch also consists of CO and H, and again the proportion between the O and the H is that which obtains in water, so that starch also is a carbohydrate.

Now let us in conclusion sum up the results of our lesson. Starch is **found in all plants.** It is *chiefly prepared from* **potatoes, rice,** and **maize** by crushing in a stream of water. The insoluble starch collects at the bottom of the vessel.

When heated, the starch grains burst, and some of the starch dissolves. *At about* 100° *C.* **dextrine or British gum** *is formed.* At a higher temperature, when **boiled in** H_2SO_4, **glucose is formed.**

This soluble substance is also *formed by the action of ferments, as in mastication and in malting.* Starch is a **carbohydrate,** *i.e.*, it consists of COH, the O and H being in the proportion that forms water.

Inulin, gums, and **cellulose** are *very similar* both in composition and in properties to starch.

COURSE 'B' IN ARITHMETIC.

A COMPLETE SYLLABUS FOR A YEAR, IN MONTHLY SECTIONS, WITH TESTS.

BY B. ELDERKIN,
Model School, Westminster Training College.

For Introductory Notice and First Month see February number of PRACTICAL TEACHER.

STANDARD I.

Syllabus—4th Month.

(*a*) Addition and Subtraction of numbers up to 60.
(*b*) Five times table.
(*c*) Multiplication by 2, 3, 4 up to 60.
(*d*) Division by 3 up to 36.

Test.

1. There are 17 children in first class, 21 in the second, 13 in the third, and 19 in the fourth; how many children are there in the school?
2. How many more are 54 than 39?
3. If there are 18 boys in one class, how many would there be in 4 classes?
4. How many threes are there in

$36 =$
$19 =$
$27 =$
$23 =$
$14 =$

STANDARD II.

Syllabus—4th Month.

(*a*) Four rules up to £1.
(*b*) Ten times table.

Test.

1. A coat costs 8s. 6d.; a vest 2s. 9d.; and trousers 7s. 11d.; how much does the suit cost?
2. How much more does the coat cost than the vest?
3. Multiply 2s. 10½d. by 6.
4. Three boys' suits cost 19s. 6d.; what would one suit cost?

STANDARD III.

Syllabus—4th Month.

(*a*) Simple and Compound Multiplication and Division by 22, 32, 42, etc.
(*b*) Simple Addition and Subtraction in four figures.
No answer to exceed £40.

Test.

1. How many are 740 sheep, 839 sheep, 706 sheep, 79 sheep, and 568 sheep?
2. Find the cost of 52 chairs at 17s. 6d. each.
3. Divide £38 5s. 0d. by 72.
4. How many oranges are 82 times 950 oranges?

STANDARD IV.

Syllabus—4th Month.

(*a*) Revise Compound Addition and Subtraction.
(*b*) Four rules in 'Time Measure.'

Test.

1. Add together 15 dys. 13 hrs. 25 min.; 29 dys. 24 min. 13 sec.; 28 dys. 16 hrs. 12 mins.; 13 dys. 16 hrs. 28 sec.
2. A horse did a journey in 4 hrs. 19 min. 35 sec., which a train did in 1 hr. 25 min. 40 sec.; how much quicker was the train?
3. (*a*) Change 3 hrs. 59 min. 38 sec. into seconds, and (*b*) 5,189 hours into weeks.
4. Add together £25 13s. 9½d.; £16 8s. 5¼d.; £5 18s. 8¾d.; £46 12s. 6d.; £24 13s. 9½d.

STANDARD V.

Syllabus—4th Month.

(*a*) Reduction of Fractions.
(*b*) Concrete Fractions.
(*c*) Reduction in Avoirdupois Weight.

Test.

1. $\frac{3}{4}$ of 10s. 6d. + $\frac{5}{8}$ of £2 12s. 4d. + $\frac{7}{10}$ of £5 15s. − $\frac{2}{3}$ of 12s. 6d.
2. Express $\frac{4}{5}$ of 7 cwt. 2 qrs. as the fraction of half a ton.
3. How many lbs. of tea could I weigh from a chest containing 3 tons 19 lbs.?
4. $15\frac{1}{2} \div (7\frac{1}{4} - 5\frac{1}{8})$.

STANDARD VI.

Syllabus—4th Month.

Simple Proportion (no Fractions or Decimals).

Test.

1. If 5 tons 12 cwt. of sugar cost £56, how much should I pay for 3 tons 15 cwt.?
2. If I purchase 51 yds. for £1 16s., how many yds. could I get for £19?
3. A bankrupt can only pay his creditors 15s. 6d. in the pound; how much would a creditor lose to whom he owed £56?
4. Simplify—

$$\frac{(300 - 5{\cdot}85) \times (5{\cdot}14 + {\cdot}06)}{47{\cdot}3}.$$

STANDARD VII.

Syllabus—4th Month.

Percentages:—
(*a*) Uses of term per cent.
(*b*) To express simple percentages as fractions of 100.
(*c*) Find the percentage one simple number is of another.
(*d*) To reduce or increase quantities by so much per cent.

Test.

1. What fraction of a number is equivalent to 2%, 2½%, 4%, 5%, and 12½% respectively?
2. How much per cent. is—
   £15 out of £25?
   20s. ,, £50?
   14s. ,, £90?
3. What is—
   5% of £135 10s.?
   2½% of 3 tons 15 cwt.?
   7½% of 7,600?
4. If the population of London were 3,500,000, find its population when it has increased by 12½ per cent.?

TESTS—FOURTH MONTH ANSWERS.

Standard I.—(1) 70; (2) 15; (3) 72; (4) 12, 13, 9, 7 + 2, 4 + 2.
Standard II.—(1) 19s. 2d.; (2) 5s. 9d.; (3) 17s. 3d.; (4) 6s. 6d.
Standard III.—(1) 2,932; (2) £45 10s.; (3) 10s. 7½d.; (4) 77,900.
Standard IV.—(1) 86 d. 22 h. 1 m. 41 sec.; (2) 2 h. 53 m. 55 sec.; (3) (*a*) 14378 sec.; (*b*) 30 wks. 6 dys. 5 hrs.; (4) £119 7s. 2¾d.
Standard V.—(1) £5 5s. 4d.; (2) $\frac{8}{9}$; (3) 6,739 lbs.; (4) $7\frac{5}{17}$.
Standard VI.—(1) £37 10s.; (2) 538⅓ yds.; (3) £12 12s.; (4) 32·3378.
Standard VII.—(1) $\frac{1}{20}$, $\frac{1}{40}$, $\frac{1}{25}$, $\frac{1}{20}$, $\frac{1}{8}$; (2) 60%, 2%, $15\frac{5}{8}$%; (3) £6 15s. 6d.; 1 cwt. 3 qrs. 14 lbs.; 570; (4) 3,937,500.

FIRST INSPECTION UNDER ART. 84B.

FIVE AND A HALF MONTHS OF THE SCHOOL YEAR HAD ELAPSED.

THE Head Inspector came at 9.35, and stayed until 12.15. He returned at 1.55, and stayed until 4.20.

He examined Standards II., IV., V., VI., and VII., and the work was taken from the syllabus book.

All the sums were dictated, and seemed to be composed on the spur of the moment.

Standard IV. did their sums and dictated words on paper, whereas all the others worked on slates.

The Inspector asked full particulars respecting the monthly examinations by the head teacher, and was pleased to hear that merit lists of the examinations in the elementary subjects were made for all Standards.

He made copious notes, and recorded the number who got the sum correct and the number wrong in each class examined.

He promised to give us another call shortly, and, if the report is as good as those received under the old system, the new style of inspection will be hailed with great satisfaction by all the teachers in this department.

Arithmetic.

STANDARDS VI. AND VII.

H.M.I. divided the class in four parts by means of numbers 1, 2, 3, 4, and gave one sum to each boy. One sum was given to Standards VI. and VII., as No. 4.

Standard VII. :—

1. The 10 per cents. are at 50. What annual income do I get by investing 10 pence? Ans. 2d.

2. Average age of A and B is 100 years. B is a week old. Find A's age. Ans. 199 yrs. 51 wks.

3. Population on January 1st is 120. In one year 10 are born and 7 die. What is the percentage of increase? Ans. 2½ per cent.

Standards VI. and VII. :—

4. A handkerchief is 18″ by 18″. How many would cover a table 9′ by 9′? Ans. 36 handkerchiefs.

Standard VI. :—

1. Numerator ½, denominator ⅜. What fraction of an hour? Ans. 45 mins.

2. A's answer 2·567; B's 2·568. Correct answer 2·5676. Who made the bigger mistake, and by how much? Ans. A by ·0002.

3. (*a*) 1001 ÷ ·001001.

(*b*) ·001001 ÷ 1001.

Ans. (*a*) 1,000,000; (*b*) ·000001.

H.M.I. questioned closely on methods employed, and asked teacher to show both classes the one about the answers (No. 2 in Standard VI.), insisting on boys telling the teacher everything, and giving words necessary to write on blackboard to show the several steps. He was particular in having the decimal point given its full name, *decimal point*, not decimal.

The mental questions were on cubic measure as applied to cubes. Number of small cubes required to make a larger? He asked what number of sides a cube had, number of corners, and number of edges?

Repetition.

In this subject Standards V., VI., and VII. were taken together. On asking how much had been prepared, H.M.I. took the card and asked the first boy to proceed. He heard about six lines, and then questioned that boy on the meanings and allusions.

Inverted phrases he asked to be re-arranged, and in one case where the word 'obscurèd' occurred he asked the reason for it; and on being told 'to make up the correct number of syllables in the line,' he asked what they were called in poetry, and was rather pleased to be answered correctly. To correct and distinct articulation he paid great attention, and several times required boys to repeat a line he had doubts about.

The Inspector gave Standards VI. and VII. the following arithmetical question, and said he would ask for the answer on his next visit :—

In an army 5 out of every 6 were Irishmen. In a battle one out of every 5 was killed. Find the least fraction of Irishmen killed.

STANDARD V.

The Inspector entered the room a little before 2 o'clock, and watched the boys take their places.

Questioned teacher as to what Arithmetic had been done, and asked for Progress Book. The class was then divided into four divisions, and a sum given to each division.

1. 500 at 19s. 11½d. each. Ans. £498 19s. 2d.

2. 2 cwt. 2 qrs. 1 st. at £70 a ton. Ans. £9 3s. 9d.

3. How many square yards in a square mile? Ans. 3,097,600 sq. yds.

4. A has a start of 1 hour, and walks 3 miles an hour B overtakes A when A has gone 12 miles. How fast does B walk? Ans. 4 miles per hour.

When the answer to the first sum was taken, the boys who had worked it £500 minus 500 halfpence were told that was the proper way.

The method of working the third sum was also asked.

After the answer to the fourth sum had been taken, the teacher was asked to work the sum on the blackboard. H.M.I. required everything written on the board to be obtained from the class, and himself made remarks on the working. The boys were asked to write about a concert, but the work was not examined.

STANDARD IV.

Gave the boys numbers 1, 2, 3, 4. Wrote four sums on the blackboard. Boys had to work the one to which their number was opposite.

1. How much is 199 times 13s. 4½d.? Ans. £133 1s. 7½d.

(Complimented those who took 200 — 1 as their factors.)

2. How many geese can you buy with £3 3s. 6d. at 1s. 4d. each? Ans. 47 geese and 10d. over.

(Wanted the reason for the query mark.)

3. The wheels of 100 carts and 110 wagons cost £80 5s. 4d.; what was the cost per wheel? Ans. 2s. 6d. and 64d. over.

4. If 8 pennies make 1 shilling, and 10 shillings make 1 pound, what will be the share of each of 3 men if £2 be divided among them equally? Ans. 6s. 5½d.

He worked the sums himself, and called out the answers. He then looked at those wrong to see how near they were to the correct answer.

While the sums were being worked samples of Standard V. readers were borrowed, and one boy was asked to read. He was quite satisfied and asked no one else.

As the last sum proved too much, the teacher was asked to work it out on the blackboard, and to reckon 5 farthings for a penny.

The following questions were then asked :—

$$4 \div 2 = 2.$$

$$4 \text{ eggs} \div 2 = 2 \text{ eggs}.$$

$$4 \text{ eggs} \div 2 \text{ eggs} = 2.$$

Some of the boys said the last one could not be done, so he demonstrated it in the following manner :—

$$\text{Smith} = A \times B.$$

A boy was told to read that.

Smith divided by A was asked. Ans. B.

" " B " Ans. A.

Instead of Smith put 4 eggs, instead of A × B put 2 eggs × 2.

$$\text{Smith} \div A = B;$$

$$\therefore 4 \text{ eggs} \div 2 \text{ eggs} = 2.$$

Poetry was then taken, and great care was taken over the enunciation, and making rapid talkers go over it again and again until it became slower. Questions were asked by Inspector on the meanings.

Word-building and Dictation were taken. He dictated the following sentences and the boys repeated them. Then the words in italics were written :—

1. *I'm as* good as you are.
2. *Where were* you yesterday?
3. I can eat the *whole* of a plum pudding.
4. I am *quite* well.
5. January, *February*, March.

The word *advise* was taken from the spelling-book, and the boys were told to write three words from it.

The word *adviser* was taken, and the boys told to make sentences containing it.

The word *conquer* was used in the same way.

The copy-books were gone through carefully.

STANDARD II.

Inspector had the class divided into 4 divisions—1, 2, 3, and 4. Each division worked one sum.

1. There were 20,000 pigs in a field. A thief came and stole 11. How many were left? Ans. 19,989 pigs.

2. If there were 25 cherries on a cherry tree, how many cherries would there be on 198 trees? Ans. 4,950 cherries.

3. If there were 19,090 seeds in 7 bags, how many would there be in one bag? Ans. 2,727 + 1.

4. How many wheels together have 126 carts and 200 wheelbarrows? Ans. 452 wheels.

The sums were dictated by H.M.I., and afterwards No. 2 was worked on blackboard by Inspector, and the class questioned on the working of it.

25 cherries
198 trees

200	cherries on	8 trees
225	,,	90 ,,
25	,,	100 ,,
4,950	,,	198 ,,

After having multiplied by the 8, which he put down as 400, he asked if it was right. If not, which figure was wrong?
What did the 4 ought to be? (2)
How many cherries on 8 trees? (200)
What was the 9 really? (90)
How many cherries on 90 trees? (2,250)
Read the third line.
That is the number on how many trees?
How many cherries on 198 trees?
100 pence? 102 pence? 20 pence? 24 pence? 26 pence? 18 pence?
Shillings in £1?
Pence in 1s.?

Writing.

Copy-books.—While the class was working the Arithmetic the Inspector examined the copy-books. He called attention to the unequal formation of letters, and the small spaces between the strokes of the m and n, and said that the secret of good writing was the equal spaces between the letters and parts of letters.

'COMPOSITION THEMES AND MORAL TRAINING.'

A SERIES OF LESSONS PREPARED ON A NEW PLAN FOR THE UPPER STANDARDS.

BY B. ELDERKIN,

Model School, Westminster College.

☞ **THE LESSONS FULLY MEET THE LATEST INSTRUCTIONS IN THE NEW CODE, 1896.**

SEE Introductory Notice in April number.

Hints for successful use of these lessons:—

a. The subject matter may be *read* over by the teacher or even by one of the scholars, or, better still, the teacher may previously read it and give the substance to the class in his own words. He may thus at discretion introduce other illustrations or omit some of those given.

b. The blackboard summary may be put before the class if the teacher is short of time, or, what is much better, a similar one may be made up while the class is being questioned on the matter of the lesson.

c. The whole of the essay should be put before the class at the first lesson, but it will often happen that there will be sufficient matter for two or more written exercises.

d. It is not intended that these lessons should be used exclusively, but that they should form a part of every month's Composition work.

e. Keep the best exercises, so that the Inspector may see the plan upon which they have been worked, as well as the topics written upon, or have a separate exercise book for Composition.

LESSON II.—ON EXCELLENCE.

1. Our great aim should be not merely to do things, but to do them as well as they can be done. Many of the things we do fail to be serviceable because we cannot do them sufficiently well, and we all know how much more pleasure and satisfaction we derive from any pursuit when we really excel in it.

2. John Ruskin tells us that he learned to paint blades of grass by lying in the meadows day after day and practising until he could paint them as well as it was possible to do them. The same great seeker after excellence also tells us how he learned to use the plane at a carpenter's bench, swept a crossing in the street, and washed down the staircase of his own lodging, not because he needed to do any of them, but simply to find out *how well they could be done.*

3. The various trades and professions which boys and girls who leave school may choose to follow, are said to be over-crowded, and increasing difficulty is experienced in finding places for the new-comers, but in every walk of life there is 'always plenty of room at the top.'

4. This truth is happily illustrated for us in the life and doings of Josiah Wedgwood, who may be termed the 'father of English pottery.' We can hardly realise the vast amount of good which he accomplished by making 'Excelsior' the motto of his great career.

5. Josiah Wedgwood was born about 150 years ago, and at the time he entered a pottery as a 'thrower,' or worker at the potter's wheel, there was not a drinking vessel or dinner plate of English manufacture fit for use, and nothing was attempted by the potter but the manufacture of butter-pots, basins, jugs, and porringers of the rudest and most fragile kind.

6. At this time Burslem contained only about 50 potters, Hanley seven, and Stoke had only two houses! There were no carts or carriages, and coals, clay, and wares were carried from place to place on the backs of men, horses, or mules. There were no roads, and the lanes or paths were so muddy and full of holes that frequently men or animals stuck fast, and not infrequently broke their legs, but more often their load of pots, in trying to extricate themselves.

7. Wedgwood's aptitude for clay-modelling showed itself in the short time he attended school, and he would delight a company of his fellow scholars by converting a lump of his favourite substance into the shape of any familiar object, or even a complete stage with its group of play actors. On being apprenticed in his brother's pottery works at the age of fourteen, he was put to the potter's wheel, and soon acquired such skill in the manipulation of the clay as to excite the admiration of his fellow workers.

8. An attack of small pox, which he had soon after, left a lingering disease in the right knee, and made it necessary for him to change the potter's wheel for the moulder's bench, and the first teapot used in England, which he made, is still preserved in the Burslem Museum.

9. The contrast between a butter-pot or basin of this early time (resembling, perhaps, a common flower-pot of to-day) and a modern Wedgwood vase or medallion, the delight of kings and princes, is so striking that it is almost inconceivable that so much progress should have been accomplished in the lifetime of one man, who died at the comparatively early age of 56.

10. Wedgwood's early efforts were directed to bring about improvements in table ware, and so successfully was this done that he received an order for a service for the King's table. After this he was appointed as 'Potter to Her Majesty the Queen,' and was allowed to name his ware 'The Queen's Ware.' An order followed from the Empress of Russia, which was adorned with no less than 1,200 views of English scenery, painted by skilled artists. It took several years to complete, and cost nearly £3,000 in its production.

11. Having perfected his 'Queen's Ware,' as it was now called, and for which an enormous sale was secured, Wedgwood set himself the tremendous task of trying to revive the lost art of the manufacture of beautiful vases and other works of art.

The discovery of the proper materials, the blending of colours, the preparation of better machinery and of kilns for burning, the search for models and designs, and the training of skilled artists and workmen for this branch, presented a combination of difficulties which would have daunted any

ordinary man, but Wedgwood's great efforts were in every respect successful, and orders came in so fast from every part of the world that it was impossible to keep pace with them. Little do we think, as we look at a beautiful vase or medallion to-day, what labour and expense have been devoted to its production!

12. Wedgwood's great standard of excellence was only attained by extraordinary diligence and painstaking, and by his insisting on the highest excellence of workmanship, from the artists and designers down to the lowest workman employed in his works.

Some idea of Wedgwood's industry may be gathered from the fact that he analysed and experimented with over 7,000 different samples of clay and earth, that every man in his service was trained under his own immediate observation, and that every article sent out passed more or less through Wedgwood's own hands.

13. He had a keen eye for defects of shape, colouring, or workmanship, and he made short work of any article which did not come up to his high standard. The walking-stick which he invariably carried, owing to his lameness, would be brought down sharply on the offending article, with the remark, 'This won't do for Josiah Wedgwood.'

14. With all Wedgwood's great success he was never a mean or selfish man, and only once protected any of his numerous inventions and improvements by taking out a patent. It is said that 'imitation is the sincerest form of flattery,' and Wedgwood had the great satisfaction of seeing his work copied by almost everyone in the same trade. He never feared competition, and always met it by trying honourably to excel his competitors either in material or workmanship.

As showing the temper of the man, it may be noted that at one time the first modeller in metal in England was so enamoured of Wedgwood's work that he threatened to enter the pottery work against him. Wedgwood replied: 'It doubles my courage to have the first manufacturer in England against me. The match likes me well. I like the man. I like his spirit. He will not be a drivelling copyist like the antagonists I have hitherto had.'

15. Wedgwood has made it difficult to emulate his success, but we may all follow his example and catch his spirit. 'Excelsior' may be our motto in whatever sphere of life we find ourselves.

England and the world wants such workers. We ourselves need to be such workmen, and if only the youths of England determine to be such there need be no fear either for their own future or their country's. One of Wedgwood's brothers, who went into the pottery about the same time, left it in disgust to enlist for a soldier because *he saw no prospect in it.* Wedgwood, on the other hand, remained to make a large fortune, to found a great national industry, and, what was to him a greater reward than all, to receive credit for having done more perhaps than any other man to educate his fellow countrymen in the love of excellence and beauty.

Blackboard Notes.

1. Our great aim: to do things as well as they can be done.
2. Illustrations from John Ruskin.
3. The great competition of life.
4. Life of Wedgwood:—
   - (*a*) Schooldays.
   - (*b*) State of English pottery 150 years ago.
   - (*c*) At the potter's wheel.
   - (*d*) Illness.
   - (*e*) At the modeller's bench.
   - (*f*) Improvements in table ware; Queen's potter; Service for Empress of Russia.
   - (*g*) Art work: vases and medallions.
   - (*h*) Wedgwood's character: industry; keen eye to faults; absence of narrowness or jealousy; challenge to modeller in metal.
5. Lessons from Wedgwood's life: contrast with his brother.

NEW PROBLEMS IN ARITHMETIC.

BY T. B. ELLERY, F.R.G.S.

President of the National Union of Teachers.

THIRD SERIES.

STANDARD I.

The first and second series of 'Problems' having been well received, I have pleasure in submitting, at the Editor's request, a third series.

Every exercise here given will suggest to the practical teacher many others of the same kind. May I say, too, that the blackboard should be freely used in the solution of these problems.

Many of the exercises may, perhaps, be considered too difficult for Standard I., but they are set for the purposes of blackboard lessons and as a preparation for the work of Standards II. and III.

Each exercise should be written on the board, read by the teacher, and then by the children. Every effort should be made to encourage the little ones to think, and to this end preliminary mental practice should be given before any one problem is attempted.

A

1. Take 59 from 130 and add 77 to your answer.

2. I bought 4 apples, then 5, and then 6. How many more must I buy so as to have twenty in all?

3. There are 32 boys in a class. I gave each boy an orange, and had 16 left. How many oranges had I at first?

4. Add the half of 18 to the half of 20.

5. How many legs in all have four cows and three hens?

6. I gave 8 nuts to each of 6 boys, and had 2 left. How many had I at first?

7. John had 28 nuts, and Fred twice that number. How many had they together?

8. Tom had 30 marbles and Harry one half of that number. How many had they together?

9. There were 28 boys and 34 girls in a class. There was a reading book for each and 4 to spare. How many books in all?

10. There are 44 boys in class 1 and 53 in class 2. If I give an apple to all of these, how many apples do I give away?

11. Add 38, 59, 67, and 185, and take 4 tens from your answer.

12. I had 14 pennies in one pocket and 8 in another. If I spent 5 pennies, how many had I then?

13. A man had 40 pennies in his pocket. He gave 7 to Tom and 3 to Harry. How many had he then?

14. Tom had 28 nuts. He gave me 8 and he lost half-a-dozen. How many had he then?

15. I have 5 bags, each containing 8 apples, and I have a dozen in a box. How many have I in all?

16. Fred has 18 apples and Walter has 12. How many must Fred give Walter so that one may have as many as the other?

B

17. In a certain school were 150 boys. 38 were in class 1, 52 in class 2, 35 in class 3, and the rest were in class 4. How many in class 4?

18. I gave away half of my marbles, and then had 37 left. How many had I at first?

19. What must you add to the sum of 85 and 91 to make 200?

20. Add 68 and 147, and then add your answer to the difference between 300 and 12.

21. Mary had 16 needles, and Jane 24. If each gave away 4, how many had they together then?

22. A farmer had 24 sheep, and then bought a dozen more. He afterwards sold nine. How many had he then?

23. A girl had 45 apples. She gave 8 to her brother and 9 to her sister. How many had she left?

24. A man bought 56 pears, then 34 more, and then 25 more. If he ate six how many had he left?

25. How many apples would a man have if he bought 64 of one man and 38 of another, and then gave away 17?

26. A gentleman had 300 oranges. He gave 68 to one man, 54 to another, and 37 to another. How many had he then?

27. Fred had 52 marbles, and he lost 17. He then bought 24 more. How many had he then?

28. James bought 12 pears and Harry twice that number. Each gave away 6. How many had they together then?

29. Frank bought 40 nuts. 6 of these were bad, and he ate 12 of the others. How many good ones had he then?

30. There were 25 boys and 35 girls in a class. If the teacher gave each of these a pen, and there were still 84 in the box, how many were in the box at first?

31. A farmer had 120 sheep. He killed 36 and then sold 48 of the others. How many had he then?

32. There are 100 boys, when all are present, in a school. If 6 of these are absent one morning, and 14 others are late, how many are early?

33. Tom had 4 pockets, and in each of them he had 12 pennies. He gave away 8. How many had he then?

34. A man had 56 apples in a basket. Each of 6 boys bought 8 of these apples. How many were there still in the basket?

35. 63 boys have a penny each, and 47 have two pennies each. How many pennies have they together?

36. I have 4 bags, each containing 5 apples. To how many boys can I give 2 each?

37. Rose had 16 needles and Emily had 30. A gentleman then gave each of them 6 more. How many had they together then?

C

38. A man earns 8 shillings each week-day. He spends 5 shillings each day. How much does he save in a week of six days?

39. Take 24 from 40, and then take 45 from 72 and add the two results together.

40. A man sells every day 36 copies of one paper and 44 copies of another paper. How many papers does he sell in 4 days?

41. I give 6 apples to each of 8 boys and 9 girls and have 24 left. How many had I at first?

42. Tom had 43 nuts and Harry 38. Mary had 16 and Jane 53. How many had the two boys more than the two girls?

43. I gave 5 apples to each of 8 boys and 6 to each of 9 girls. How many did I give away?

44. I bought 45 apples, then 38 more, and then 66 more. I ate 3 and gave away 7. How many had I then?

45. A man bought 18 cows. He sold 7 and afterwards 5 more. He then bought 36. How many had he then?

46. If I buy 40 apples and give away 16, and then buy 32 more and give away 18, how many have I now?

47. A farmer bought 150 sheep, then 84 more, and afterwards 56 more. He sold 50 to one man and 50 to another. How many had he then?

48. Frank had 18 pennies in a box, James had 6 more than Frank, and Harry had as many as Frank and James together. How many had they in all?

49. In a certain school there are 120 boys and 135 girls. One morning 16 boys and 18 girls are absent. How many oranges must I buy to give one to each child present?

50. Walter had 58 marbles in one bag, 56 in another and 24 in another. He gave away 14 and lost 26. How many had he then?

51. A man had 3 bags, in each of which were 64 apples. He gave an apple to each of 28 boys and 48 girls. How many apples left?

52. A woman had 36 eggs in each of 2 baskets and 24 in each of two others. How many had she in all?

53. A woman bought 27 oranges on Monday and 6 more than that number on Tuesday. She used ten. How many had she then?

54. A farmer bought 45 sheep and then 73 more. He sold 6 to each of 5 men. How many had he then?

55. I had 66 pencils. I gave 8 to Emily and 3 to each of 7 boys. How many had I then?

56. Tom has six pennies in one bag and five times that number in another. How many more will he require to make 60?

57. A gentleman had 58 apples. He gave fifty to a man, and divided the rest equally between two girls. How many did each girl receive?

58. A man bought 6 apples at 2 a penny, and 12 at 3 a penny. How many pennies did he spend in all?

59. How many buns must I have so that I may give 2 to each of 19 boys and 23 girls, and have a dozen left?

60. James had 84 apples and Henry 59. James then gave Henry 20. How many had Henry then more than James?

ANSWERS.

1. 148	21. 32 needles	41. 126 apples
2. 5 apples	22. 27 sheep	42. 12 nuts more
3. 48 oranges	23. 28 apples	43. 94 apples
4. 19	24. 109 pears	44. 139 apples
5. 22 legs	25. 85 apples	45. 42 cows
6. 50 nuts	26. 141 oranges	46. 38 apples
7. 84 nuts	27. 59 marbles	47. 190 sheep
8. 45 marbles	28. 24 pears	48. 84 pennies
9. 66 reading books	29. 22 nuts	49. 221 oranges
10. 97 apples	30. 144 pens	50. 98 marbles
11. 309	31. 36 sheep	51. 116 apples
12. 17 pennies	32. 80 boys early	52. 120 eggs
13. 30 pennies	33. 40 pennies	53. 50 oranges
14. 14 nuts	34. 8 apples	54. 88 sheep
15. 52 apples	35. 157 pennies	55. 37 pencils
16. 3 apples	36. 10 boys	56. 24 pennies
17. 25 boys	37. 58 needles	57. 4 apples each
18. 74 marbles	38. 18 shillings	58. 7 pennies
19. 24	39. 43	59. 96 buns
20. 503	40. 320 papers.	60. 15 apples more

NEW COMPOSITION STORIES.—STANDARD V. AND 1st YEAR P.T.'s.

Suitable for 'Unseen Tests' in Reading also.

481.

OUTWITTING THE JEW.—A Jew who kept a jeweller's shop used to leave his daughter in charge of it during his absence. On one of these occasions a sailor came in and asked to look at some watches. She handed down four from the shelf at the end of the counter, marked respectively, £10, £8, £6, and £2, and arrayed them in the order of their value. These the sailor examined, but while the girl's back was turned he slipped the £2 watch into the place occupied by the £8 one. Presently, he picked up the £8 watch and said, 'I'll take the cheap watch, handed over the £2, and made off. After he had gone she discovered the trick, and sought refuge in tears. On the Jew's return, she told him, in a distressed manner, about it. 'Oh, well, never mind, my dear,' said he. 'Those watches were all the same price—the price you got.' 'But,' looking at her seriously, 'what a rogue that sailor must have been.'

482.

AT a certain horse market two dealers, named King and Jones, haggled over a price for the latter's horse. Finally, they came to terms, but no sooner was the money paid over than Jones felt he had been duped, and determined to regain possession of the horse. King was in the habit of refreshing himself at a tavern near the horse market, and thitherward he now turned. Jones watched him enter, and, knowing the direction he would be likely to take going to his home, he went on the road and waited for him. Ere many minutes he saw King coming along the highway. Taking off one of his boots, he threw it into the road, where the horseman must see it. King came along whistling in high glee, when suddenly he caught sight of the boot. 'Shall I get off and take it,' he said to himself. 'It certainly seems a good one? No! What nonsense! What good is one boot without its mate?' He went about 200 yards further, when he noticed the mate of the boot he had just passed. This was luck indeed, and leaping from his steed, he tied his horse by the roadside, picked up the boot, and flew like wildfire back for the other. Just as he got out of sight, Jones came from behind the hedge, where he had been waiting, untied and mounted his horse, and, although barefooted, was soon off, chuckling at the success of his scheme.

483.

TOO MANY BUTTONS.—A clergyman's wife was mending clothes for her boys when one of her lady neighbours called in to have a friendly chat. It was not long before the visitor's eye was attracted by a large basket, more than half filled with buttons. The lady could not help remarking that there seemed a very good supply of buttons. Thereupon she began to turn them over, and suddenly exclaimed—'Here are two buttons exactly the same as those my husband had on his last winter suit. I should know them anywhere.' 'Indeed,' said the clergyman's wife quietly, 'I am surprised to hear it. As all these buttons were found in the collection bag, I thought I might as well put them to some use.' Before she had finished speaking, the visitor hastily arose, and said she must be going. The story soon got about, and since then no buttons have been found in the collection-bag.

484.

OVERCOME.—A mouse, ranging about a brewery, happening to fall into a vat of beer, was in imminent danger of drowning, and appealed to a cat to help him out. The cat replied, 'It is a foolish request, for as soon as I get you out I shall eat you.' The mouse piteously replied, 'That would be far better than to be drowned in beer.' The cat lifted him out; but the fumes of the beer caused puss to sneeze, and the mouse took refuge in a hole. The cat called upon the mouse to come out. 'Did you not promise that I should eat you?' 'Ah,' replied the mouse, 'I did; but, you know, I was in liquor at the time.'

485.

ANXIOUS TO PLEASE.—A lady had a large collection of gold-fish, which were supplied with fresh clean water every day. Once, however, she had occasion to discharge her servant girl. When she took another girl, the lady gave her strict orders that the fish were to be kept clean. For the first day or two after the arrival of the new servant, the fish seem to be ailing. Some of them died, and the others seemed very weak, and had their gold scales broken and discoloured. On the third morning the mistress happened to rise earlier than usual, and found the servant girl at her morning's work. The gold-fish were lying out on the table, while the girl was busily taking up one after another and rubbing them with polishing-paste. This was how she obeyed the orders of her mistress as to keeping them clean.

486.

CABBY DROVE OFF.—A gentleman in London was one night driven home, and paid the cabman what he supposed to be two shillings. He had taken the coins from his waistcoat pocket, but as soon as they had passed from his hands he noticed their peculiar glitter, and said, 'Stop, cabman! I've given you two sovereigns by mistake.' 'Then you've seen the last of them,' said the cabman, whipping his horse and driving briskly away. Then the gentleman felt again in his pocket, and found that he had given the man two bright new farthings, which he was keeping for his children.

487.

THE DOG AND THE TELEPHONE.—An intelligent dog was recently discovered wandering about the streets of an American city by a gentleman who knew it. He at once asked its master by means of the telephone whether he had lost his dog. The reply came, 'Yes, have you seen it?' To which the further instruction was sent: 'Suppose you call him through the telephone.' Accordingly, the dog was lifted up, and the ear-piece placed to its ear. 'Jack! Jack!' shouted its owner, whereupon Jack, recognising the voice, began at once to yelp most vigorously, and licked the telephone in a friendly way, evidently thinking that its master was inside the machine.

488.

WHAT A MOUSE DID.—A lady, whilst engaged in her domestic duties, encountered a mouse in the flour-barrel. Most ladies, under similar circumstances, would have uttered a few shrieks, and have run away; but this one possessed more than ordinary courage. She summoned the man-servant, and told him to get the gun, call the dog, and station himself at a convenient distance. Then she clambered half-way upstairs, and commenced to punch the flour-barrel with a pole. Presently the mouse made its appearance on the floor. The dog at once went in pursuit. The man fired, and the dog dropped dead. The lady fainted, and fell down the stairs; and the man, thinking that she was killed, and fearing that he would be arrested for murder, disappeared, and he has not been seen since. The mouse escaped also.

489.

ONE WAY OF PASSING LIGHT COIN.—At one time it was very difficult to pass a coin, especially a gold one, if it was much worn, and, consequently, under weight. A gentleman who had a light half-sovereign, but did not like to attempt to pass it himself, gave it to his Irish servant to do so whilst buying a newspaper. When the man returned he went triumphantly to his master, and said with glee, 'I passed it, your honor.' 'You are a clever fellow,' returned his master, holding out his hand for the change. 'What do you want, sir?' asked the Irishman. 'Why the change, of course,' said the

B

17. In a certain school were 150 boys. 38 were in class 1, 52 in class 2, 35 in class 3, and the rest were in class 4. How many in class 4?

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19. What must you add to the sum of 85 and 91 to make 200?

20. Add 68 and 147, and then add your answer to the difference between 300 and 12.

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30. There were 25 boys and 35 girls in a class. If the teacher gave each of these a pen, and there were still 84 in the box, how many were in the box at first?

31. A farmer had 120 sheep. He killed 36 and then sold 48 of the others. How many had he then?

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13. 30 pennies
14. 14 nuts
15. 52 apples
16. 3 apples
17. 25 boys
18. 74 marbles
19. 24
20. 503
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29. 22 nuts
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OVERCOME.—A mouse, ranging about a brewery, happening to fall into a vat of beer, was in imminent danger of drowning, and appealed to a cat to help him out. The cat replied, 'It is a foolish request, for as soon as I get you out I shall eat you.' The mouse piteously replied, 'That would be far better than to be drowned in beer.' The cat lifted him out; but the fumes of the beer caused puss to sneeze, and the mouse took refuge in a hole. The cat called upon the mouse to come out. 'Did you not promise that I should eat you?' 'Ah,' replied the mouse, 'I did; but, you know, I was in liquor at the time.'

485.

ANXIOUS TO PLEASE.—A lady had a large collection of gold-fish, which were supplied with fresh clean water every day. Once, however, she had occasion to discharge her servant girl. When she took another girl, the lady gave her strict orders that the fish were to be kept clean. For the first day or two after the arrival of the new servant, the fish seem to be ailing. Some of them died, and the others seemed very weak, and had their gold scales broken and discoloured. On the third morning the mistress happened to rise earlier than usual, and found the servant girl at her morning's work. The gold-fish were lying out on the table, while the girl was busily taking up one after another and rubbing them with polishing-paste. This was how she obeyed the orders of her mistress as to keeping them clean.

486.

CABBY DROVE OFF.—A gentleman in London was one night driven home, and paid the cabman what he supposed to be two shillings. He had taken the coins from his waistcoat pocket, but as soon as they had passed from his hands he noticed their peculiar glitter, and said, 'Stop, cabman! I've given you two sovereigns by mistake.' 'Then you've seen the last of them,' said the cabman, whipping his horse and driving briskly away. Then the gentleman felt again in his pocket, and found that he had given the man two bright new farthings, which he was keeping for his children.

487.

THE DOG AND THE TELEPHONE.—An intelligent dog was recently discovered wandering about the streets of an American city by a gentleman who knew it. He at once asked its master by means of the telephone whether he had lost his dog. The reply came, 'Yes, have you seen it?' To which the further instruction was sent: 'Suppose you call him through the telephone.' Accordingly, the dog was lifted up, and the ear-piece placed to its ear. 'Jack! Jack!' shouted its owner, whereupon Jack, recognising the voice, began at once to yelp most vigorously, and licked the telephone in a friendly way, evidently thinking that its master was inside the machine.

488.

WHAT A MOUSE DID.—A lady, whilst engaged in her domestic duties, encountered a mouse in the flour-barrel. Most ladies, under similar circumstances, would have uttered a few shrieks, and have run away; but this one possessed more than ordinary courage. She summoned the man-servant, and told him to get the gun, call the dog, and station himself at a convenient distance. Then she clambered half-way upstairs, and commenced to punch the flour-barrel with a pole. Presently the mouse made its appearance on the floor. The dog at once went in pursuit. The man fired, and the dog dropped dead. The lady fainted, and fell down the stairs; and the man, thinking that she was killed, and fearing that he would be arrested for murder, disappeared, and he has not been seen since. The mouse escaped also.

489.

ONE WAY OF PASSING LIGHT COIN.—At one time it was very difficult to pass a coin, especially a gold one, if it was much worn, and, consequently, under weight. A gentleman who had a light half-sovereign, but did not like to attempt to pass it himself, gave it to his Irish servant to do so whilst buying a newspaper. When the man returned he went triumphantly to his master, and said with glee, 'I passed it, your honor.' 'You are a clever fellow,' returned his master, holding out his hand for the change. 'What do you want, sir?' asked the Irishman. 'Why the change, of course,' said the

master. 'How would the man give me change seeing I passed it so cleverly,' was the reply. 'What do you mean,' asked the master now. 'Why, sir, I stuck it between two halfpence when I paid for the paper, and the clumsy fellow never saw it.'

490.

A HASTY REMOVAL.—There is a story told of a young man who was invited to dine with a gentleman of rather a changeable temper. The dining room was on the second floor, and the principal dish a fine roast fowl. When the old gentleman undertook to carve it, he found the knife rather dull, and in a sudden passion flung it downstairs after the servant. Whereupon the young man seized the fowl, and with admirable dexterity hurried it after the knife. 'What ever do you mean?' exclaimed the old gentleman. 'I beg your pardon,' was the cool reply. 'I thought you were going to dine downstairs.'

491.

THE ANGELUS BIRD.—When travelling in the forests of South America it is not uncommon to meet with a bird whose music greatly resembles that of an Angelus bell, when heard from a distance. The Spaniards call this singular bird a bellringer, though it may be more appropriately designated as the Angelus bird; for, like the Angelus bell, it is heard three times a day—morning, noon, and night. Its song, which defies all description, consists of sounds like the strokes of a bell, succeeding one another every two or three minutes so clearly and in such a resonant manner that the listener, if a stranger, imagines himself to be near a chapel or convent. But it turns out that the forest is the chapel and the bell a bird. The beauty of the Angelus bird is equal to his talent. He is as large as a thrush and as white as snow, besides being graceful in form and swift in motion. But the most curious ornament of the Angelus bird is the tuft of black arched feathers on his beautiful head; it is of conical shape, and about four inches in length.

NEW READING TESTS.—STANDARD III.

Suitable for 'Unseen Tests' in Dictation also.

353.—Then the party went 'downstairs,' and saw the cabin, which was clean and tidy, where they had some biscuit and water, and then the boatman said it was time to go. So they rowed back to the beach, and went home to dinner. After tea they strolled out again on the pier, and stood at the end where the small lighthouse is, and gazed out to sea to watch the revolving light.—(H.M.I.'s Test.)

354.—Inside a lighthouse, which is strongly built upon a rock out at sea, are floors and rooms like a house, only rounded instead of squared walls. On the first floor is the storeroom. Into this we shall have to mount from the rock, by an iron ladder quite thirty feet above the sea level. This is very steep indeed; and I have read of one gentleman who was afraid to climb down, so the men let him down with a rope. —(H.M.I.'s Test.)

355.—The fearless girl determined to save her master herself. Wrapping the chief's cloak round her and putting his hat on her head, she went into the wood and blew the horn. Instantly ten men appeared. Making signs to them with the axe, and not saying a single word, she led them to the inn, and motioned to them to go into a large empty room. This she bolted up in the same way as the other.—(H.M.I.'s Test.)

356.—As they pondered in sad and terrified silence a footstep was heard approaching. Each prisoner turned his head in the direction of the entrance, but no one came there. A moment afterwards a hissing noise arose, as if some whispered conversation was going on between the guards and some new arrival. The inmates of the hut could not see, as night was falling quickly.—(H.M.I.'s Test.)

357.—George was a small lad for thirteen, but he had a big determination to get on, which, after all, is more than half the battle. He was as fond of his books as most boys, but what he loved best of all was the holiday time in harvest, when one of the farmers used to give him work, and George led and drove the waggon-horses as they plodded along with the heavy loads of golden grain.—(H.M.I.'s Test.)

358.—Next day was fortunately very fine: just a nice wind and a hot sun when the children went out in old Ben's boat to see the lightship, which was painted red, and had a great big ball of wood stuck on the mast above the lamp, or beacon, as it is called. The children were delighted to go on board, and the men—quite a number of them—seven on the ship at one time—were glad to see them.—(H.M.I.'s Test.)

359.—One man was magnificently dressed, and had an axe resting against his knees; the other was the landlord of the inn. The brave girl put her ears close to the window, and heard just enough of their conversation to know that the stranger was a robber chief, and that when he blew his horn his followers would come out of hiding to the inn and rob, perhaps kill, the travellers.—(H.M.I.'sTest.)

360.—I do not think there is much more to tell you. The clerks sort the letters, and write the addresses of the registered ones. Of course the train is running very fast all this time, and they must be very quick to sort and pack up the letters so as to be ready at every place. They sort thousands of letters and parcels every night, and by day also.——(H.M.I.'s Test.)

361.—The children knew well the truth of all she said. They knew, too, that their present stock of provisions might soon be taken from them. The soldiers of the enemy were conquering their beautiful country in many directions, and it had even been reported that a troop of soldiers were actually prowling about in that very quarter. No wonder that they felt timid that bitter winter's afternoon.—(H.M.I.'s Test.)

362.—Strange sounds had mingled with his dreams, and he woke in a fright. Most dreams pass away when one wakes; but, to the chemist's surprise, he heard the sounds which had distressed him still. He rubbed his eyes and his ears, and listened again. Yes, there was no doubt about it: those sounds which had turned peaceful dreams into horrid nightmare came from a room in his own house.—(H.M.I.'s Test.)

363.—A great number of women and girls, and some children, are employed in the manufacture of musical-boxes, but they do their part of the work at home, and bring it to the manufactory. We found some of the men finishing off, fixing the little bits of metal, hardly larger than the tops of needles, to the wheel which revolves round and round, and makes the music.—(H.M.I.'s Test.)

364.—
Never forget thy father,
Who, cheerful, toils for thee;
Within thy heart may ever
Thy mother's image be;
Thy sister dear, and brother,
They long for thee to come—
Never forget the dear ones
That cluster round thy home.

NEW DICTATION TESTS.—STANDARD IV.

Suitable for 'Unseen Tests' in Reading also.

No. 381.

THE seal-ring worn by the Pope, and used by him on official documents to which his signature is attached, has on it the engraving of a fish, with the cipher of the wearer. Since the thirteenth century every Pope has worn a ring of this character, and it is shattered with a hammer when the wearer dies, to prevent its use on a forged document.

No. 382.

THE popular impression concerning the bee must be revised. It has long been praised for its industry and diligence, but it has recently been learned that in these respects the bee is a fraud. As a matter of fact, 'the little busy bee' works but about three hours a day, and is a most thorough-going loafer for the rest of the time.

No. 383.

CAPE HORN is a great mass of rock rising abruptly from the sea and forming a small island. Upon one of the ledges of this rock stands a covered barrel, the international letter-box of a region more than 500 miles from anything that resembles civilisation. It is the custom of captains passing round the Horn to send a boat ashore at this point if possible, take whatever mail is going in the direction of the vessel, and drop in whatever it is desired shall go in the other direction.

No. 384.

ONE of the newest things seen in London is a lady's walking-stick. It has the appearance of an umbrella rolled extremely tight, and is slender to a degree. The handle, in ebony or light walnut, with a gold band, is convenient to hold. Many women who love walking with a support forego the pleasure because of the look of the ordinary stick. The mock umbrella changes all this. It has, moreover, the advantage of being as light as a feather.

No. 385.

IN the days of Queen Elizabeth it was customary to strew green rushes on the uncarpeted floor of the actor's retiring room in theatres—hence the term green-room. Subsequently it was usual to decorate the walls with green paper, and sometimes the rushes gave way to a carpet of green baize.

No. 386.

A DOG which can put out fire is a friend of the fire insurance companies. A sensible man has taught his dog, a water spaniel, to extinguish fire whenever it sees anything burning. To test the little dog, a piece of paper was ignited and dropped on the floor. In an instant the dog jumped upon it, and very quietly extinguished it by rubbing it with its paws. The dog was tried with a lighted cigar, with the same result.

No. 387.

A CURIOUS watch has been brought out in France. The dial is transparent, but there are no works behind it, and the hands appear to move by magic. The secret lies in concealing the works at the edge of the case and communicating the motion to the hands by means of a glass disc, which acts as a toothed wheel. This disc revolves between the front and back of the dial, which are both of glass, and hence its motion is unperceived.

No. 388.

AMONG the ancient warriors it was usual to honour such of the followers as distinguished themselves in battle by presenting them with a feather to wear in their caps, which, when not in armour, was the covering for their heads, and no man was permitted the privilege who had not at least 'killed his man.' The memory of this old compliment is yet retained among us by the customary saying, when any person has effected a meritorious action, that it will be a 'feather in his cap.'

No. 389.

THERE is nothing that more intensely delights Her Majesty than to have her tiny grandchildren about her, to watch them at their childish games, and to personally superintend all those little details of nursery management which are none the less dear to her heart because Fate has made her the ruler of an empire.

No. 390.

THE Freemasons are an order the principal objects of which are social enjoyment and mutual support and assistance among the members. There are a great many charities and boys' and girls' schools connected with the craft. The members observe secrecy in their proceedings, and claim an almost fabulous antiquity for the foundation of the order. The rules are not published for general circulation.

No. 391.

THE laws of social welfare press on all of us, whatever may be our condition. Something speaks to us, above all voices of human authority, in condemnation of selfishness, in defence of liberty and truth, in favour of justice and generosity. Only as we obey this still small voice, only as we listen attentively to catch its most distant tones, only as we exercise our faculties to discover its full meaning, are we able to interpret it for others, or to urge them to obedience.

No. 392.

THOUGH dark the clouds be o'er our life,
We trust and fear no ill,
For has not every darkest cloud
Its silver lining still?
They say each rose has a hidden thorn,
Though fragrant and fair to sight,
But I love to think that the darkest cloud
Has its silvery lining bright.

STANDARDS V.—VII., AND 1ST & 2ND YEAR P.T's.
Suitable for 'Unseen Tests' in Reading also.

No. 325.

IF there is no time for a second reading, it is an excellent idea to read with a blue pencil in hand, and to mark those passages on which one would like to bestow further thought. In the eyes of some people, marking a book is an unpardonable sin; but the practice has many advantages. The value of the marked volume is greatly enhanced, not only to the owner, whose attention is thus readily called to passages of special interest and importance, but also to the borrower, who is able to follow the reader's thought, and learn his judgment and taste. The objection that a book whose margins are interlined looks less clean and fresh than if free from markings, has no weight.

No. 326.

WHEN a London merchant wants a thoroughly capable and efficient assistant, one who will be a help and not a hindrance to him, he looks for him abroad, and usually finds him. He knows it would be almost hopeless to find the article he wants at home. By all means let us take account of foreign competition, but let us, at the same time, remember that the remedy is in our own hands. We must specialise our teaching. Fathers must ask for a proper business education for their boys, and see that they get it. When our middle-class schools have learned how to turn out young men of business carefully trained and thoroughly conversant with the technicalities of their calling, we shall cease to fear the bugbear of German competition.

No. 327.

The ordinary employer pays the least he can for labour, and labour, taught by that example, gives the least it can in return. The workman has in him qualities of thought, contrivance, interest, pride, and good-will in work. These no employer buys. In an industrial partnership they are bought, and workpeople make profit by economy in material, by increasing the reputation of the firm; they make profit by putting character and honesty into their work; and by diminishing, in a thousand ways, the anxiety and care of the employer. An industrial partnership is not a sentimental, but a good business arrangement, which pays.

No. 328.

FROM the lowest to the highest, all of us in our way spend money, and dress, and eat, and drink, and generally order our lives on a scale we should not think of adopting if it were not for 'other people.' The great bulk of our money troubles, and nearly all the cheating, and lying, and wickedness in the world connected with money, which has been described as the 'root of all evil,' may be traced to the love and desire of standing well in the estimation of 'other people,' of being thought richer than we are, and with being credited with the possession of property or resources which do not, as a matter of fact, belong to us.

No. 329.

MAN is the creature of interest and ambition. His nature leads him forth into the struggle and bustle of the world. Love is but the establishment of his early life, or a song piped in the intervals of the acts. He seeks for fame, for fortune, for space in the world's thought, and dominion over his fellow-men. But a woman's whole life is a history of the affections. The heart is her world; it is there her ambition strives for empire; it is there her avarice seeks for hidden treasures. She sends forth her sympathies on adventure; she embarks her whole soul in the traffic of affection, and, if shipwrecked, her case is hopeless, for it is a bankruptcy of the heart.

No. 330.

DOCTORS state that in the period between midnight and six in the morning the animal vital processes are at their lowest ebb. It is at these times that those who are enfeebled from any cause most frequently die. Physicians often consider these hours as critical, and forewarn anxious friends in respect to them. From time immemorial those who have been accustomed to wait and attend on the sick have noted the hours most anxiously, so that they have been called by our old writers 'the hours of fate.' In this space of time the influence of the life-giving sun has been longest withdrawn from man, and the hearts that are even the strongest beat with subdued tone.

No. 231.

THE man who walks through a country is much more truly a traveller than another who sits in a railway carriage, or even than he who is drawn by horses. And he is also a more original traveller, not only because he is doing what others do not do, but, for a sounder reason, because he is really travelling among the people, observing their manners, seeing what they are like, learning what they are thinking about, and having with them that constant communication which alone can tell him how their pulse beats and what fibre they are made of. Until you know this, you only know the outsides of men, though, if you don't like them, perhaps the outsides may be enough. If you don't like the people you are travelling among, your journey is robbed of half its pleasure.

No. 332.

THE man who has really resolved to live the best life that he can, must begin right where he is—begin where his failures, his false education, his errors, and his sins have left him. By no single stroke of the pen can we erase whole pages in the history of our lives. We have made or unmade ourselves as we are. If we could only begin at some lofty height which our moral dreams picture for us, it seems to us that there would be inspiration in going still farther; but we cannot substitute, in a moment, the dream-life for the real one. We are surrounded on every side by hard and tangible realities.

No. 333.

A FEELING of brotherhood is binding men together for the protection of the lowest stratum of the London poor, and, when they speak in the future, it will be to a public conscience, enlightened, earnest, and purified. It is certain that in the coming years the greedy man will not have so comfortable a time as did his money-making ancestors before him. In addition to the public sentiment which has been aroused in their favour, the poorer classes are better educated, better organised, and have a fuller sense of their power than they ever possessed before. It will be well that a force so pregnant with good or evil should be directed by wise counsels and sympathetic example into peaceful ways.

334.

To the pure heart, 'tis happiness to mark
The tree-tops waving in the warm sunshine,
To hear thy song, thou cloud-embosom'd lark,
Like that of some fair spirit all divine—
To lie upon the forest's velvet grass,
And watch the timid deer in distance pass.
The green leaves waving in the morning gale,
The little birds that 'mid their freshness sing,
The wild-wood flowers so tender-eyed and pale,
The wood-mouse sitting by the forest spring,
The morning dew, the wild bees' woodland hum—
All woo my feet to Nature's forest home.

COMPOSITION TESTS.—STANDARDS VI. & VII., AND 1ST & 2ND YEAR P.T.'S.

Write at least 20 lines on ONE of the following:—

168. Homes without Hands.
169. A Letter to a Parent from a Canadian Emigrant.
170. The way you would entertain a Friend who came to spend a week with you.
171. 'A rolling stone gathers no moss.'
172. 'It's an ill wind that blows nobody good.'
173. Benefits of a knowledge of drawing.
174. The Travels of a Raindrop.
175. The Daily and Weekly Papers of your Town.
176. 'Charity begins at home.'
177. Advantages of Early Rising.
178. The Instinct of Animals.
179. Britannia needs no Bulwarks.
180. 'Where ignorance is bliss 'tis folly to be wise.'

Circular 188.

LEAVING CERTIFICATE, 1896.

SCOTCH EDUCATION DEPARTMENT.

1st April 1896.

SIR,

I AM directed to remind you that the examination for Leaving Certificates will begin on Monday the 15th June, and I am to give the following further particulars with respect to it.

About a month before the examination, my Lords will issue a form on which they will ask for exact information as to the numbers to be examined in the various grades of each subject.

Candidates must be pupils of the school at which, or in connexion with which, they are examined, and must have been in regular attendance from January to the date of the examination. They may be presented in any grade of any subject. In no case does the result of examination in a paper taken in a previous year affect the examination.

The following subjects will be included in the Examination:—English (including questions on Modern History and Geography), Latin, Greek, French, German, Mathematics (including Arithmetic), and Book-keeping with Commercial Arithmetic.

If the authorities of any school should desire to present pupils in Italian, early intimation should be sent to the Department.

Certificates of three Grades,—Lower, Higher, and Honours—will be given in each of these subjects except Book-keeping and Commercial Arithmetic, where one grade of certificate only be given.

For information as to the arrangement of the papers and the character of the questions in Mathematics, I am to call your attention to the Note as to Mathematical Papers. I am also to call your attention to the Note as to Papers in English and the Memorandum as to Papers in Modern Languages. Copies of these Notes have already been sent to you.

As on previous occasions, the examination will be general and not in prescribed books. In the English Papers, where this might operate unfairly, my Lords will endeavour to meet the difficulty by giving a considerable choice of questions in History, Literature, and Geography. Such an amount of knowledge as will enable a candidate to answer a sufficient number of the questions set in History and Geography may be expected from every pupil, and candidates in the Lower and Higher Grades will be required to satisfy the examiners that they possess a competent knowledge of at least one of these subjects. Candidates in the Honours Grade will be at liberty to answer any of the questions set in the First Paper (Higher Grade Paper) in History and Geography, and the marks obtained will be allowed to count towards the number required to obtain a pass.

My Lords have noticed, with regret, that a large number of candidates are presented in a grade higher than their attainments warrant, and thus the number of failures is considerably increased. They are of opinion that candidates should not be presented in a grade higher than that in which they are likely to pass, and they fear that the issue of certificates, in certain cases, in a lower grade than that in which candidates are presented, has, to some extent, encouraged the practice. They will not at present withdraw this concession; but they desire to give notice that a certificate of a lower grade will, in such cases, be issued only to a very limited extent. Their Lordships will be unable to issue a Lower Grade Certificate in any subject to candidates who take papers in the Honours Grade and fail to qualify for a certificate in the Higher or Honours Grade. In Mathematics a certificate will in no case be awarded in a lower grade than that in which the candidate is presented.

In Latin, Greek, French, German, and English, two papers will be required in the Honours Grade. In Book-keeping and Commercial Arithmetic separate papers will be set, but a Certificate will be granted to those candidates only who pass in both branches.

The examination will take place simultaneously in each school, beginning on Monday, June 15. The subjects will be taken in the following order:—

Monday, June 15th	10 a.m.	Arithmetic.
" "	12 noon.	Geometry.
" "	3 p.m.	Algebra.
Tuesday, June 16th	10 a.m.	English.
" "	2 p.m.	German.
Wednesday, June 17th	10 a.m.	French.
" "	2 p.m.	Greek or Book-keeping.
Thursday, June 18th	10 a.m.	Latin.
" "	2 p.m.	Greek (2nd honours paper) or Commercial Arithmetic.

Friday, June 19th - -	10 a.m.	Trigonometry and Logarithms.*
,, ,, - -	12 noon.	Analytical Geometry.
,, ,, - -	2 p.m.	Dynamics.
,, ,, - -	4 p.m.	Geometrical Conics.
Monday, June 22nd -	10 a.m.	English (2nd honours paper).
,, ,, - -	2 p.m.	Latin (2nd honours paper).
Tuesday, June 23rd -	10 a.m.	French (2nd honours paper).
,, ,, - -	2 p.m.	German (2nd honours paper.

* The use of a book of Mathematical Tables is allowed, provided it contains no manuscript notes or printed matter other than such as refers to the use of the Tables. Each candidate should be provided with a separate book.

On each occasion the papers for the Lower Grade, the Higher Grade, and the Honours Grade Certificate in each subject will be set simultaneously. The time allowed, except where otherwise stated, for each paper in Languages and English will be two hours and a half in the Lower Grade, and three hours in the Higher and Honours Grades. For the time allowed for the various subjects in Mathematics, you are referred to the Note as to Mathematical Papers.

The examination will be held at the school from which candidates are presented, unless the authorities are informed to the contrary. A suitable room or rooms must be provided, also pens, ink, and blotting paper. Slates may not be used, nor pencils, except in the drawing of mathematical figures.

The use of scroll paper is absolutely prohibited. The rough work (if any should be necessary) as well as the fair copy, is to be written in the books, and candidates should draw their pen through the rough work.

One piece of blotting paper only should be supplied to each candidate. It must be left on the desk at the end of each sitting. *Writing of whatever kind on blotting paper is strictly forbidden.* A fresh piece may be supplied by the supervising officer to a candidate who requires it and gives up the piece first supplied.

The books in which the answers are to be written will be supplied by the Department, and will be forwarded to the Head Master a few days before the examiaation.

Any candidate introducing any book or note of any kind into the examination room, or detected in copying, will be instantly dismissed and the case reported to the Department.

My Lords regret that in previous years there have been several cases in which serious copying has been detected, and they desire to impress upon school authorities the importance of doing all that is possible to prevent such dishonesty. Their Lordships feel bound to deal with the practice severely, and candidates should be warned, before the examination, that a certificate will not be issued, in any subject, to a candidate in whose papers, or in any one of them, indisputable evidence of copying is detected.

My Lords will appoint an officer to represent the Department at the examination. He will distribute the papers and supervise the examination. If, *in any subject*, all the candidates cannot be accommodated in one room, information must be sent to the Department AT LEAST ONE MONTH before the examination, so that the necessary number of supervising officers may be appointed. Such supervision cannot be entrusted to anyone who does not represent the Department.

The selection of candidates from any school rests entirely with the authorities of that school, and, in regard to this, they must act on their own responsibility. At the same time, in order that this examination may form a satisfactory supplement to the inspection of the higher class schools, it is understood that, as a general rule, the pupils of the highest class, or of the highest class and that next to it in such schools should be presented. It is undesirable, if the examination is to serve as a test of the real merits of a school and the scope of its curriculum, that the candidates should be confined only to a few selected pupils. But, having indicated this view, my Lords do not desire to lay down any strict rule which might interfere with the discretion of the managers.

In the case of candidates who desire to qualify by this examination for exemption from examinations of the University of Oxford, or the University of Cambridge, it is essential that notice should previously be given to this Department, and a list of the names of such candidates must be furnished on a form for this purpose, which may be obtained on application to the Department. If, subsequently, candidates should determine not to proceed to either University, notice must be given *before* the 25th July. In the absence of such notice, the papers will be sent to the Schools' Examination Board, and the ordinary fee will fall to be paid to that Board.

In regard to their Lordships' Circular (No. 182) of the 9th December last, sent to State-aided schools, I am to explain that, while my Lords are unable to hold an examination at, or in connexion with, a school from which candidates are presented only in Arithmetic and English of the Lower Grade, this rule will not preclude pupils of the school from being presented in these subjects only, in cases where my Lords have agreed to hold an examination.

I have the honour to be, Sir,

Your obedient servant,

H. CRAIK.

SOME OFFICIAL DOCUMENTS OF THE SCOTCH EDUCATION DEPARTMENT.

No striking changes mark the Scotch Code of 1896, but the few changes that have been made are all in the right direction. Opposite the clause demanding for boys 'suitable instruction during the time in which the girls are taught needlework,' all teachers read with great satisfaction the expressive brevity 'dropped.' The storm period during which 'combined' attendances can be made has also been wisely extended from 1st March to 1st April.

A valuable concession has been made by the introduction of Art. 19 F, which provides for that very frequent case in which the grant of a school is seriously affected by causes over which neither teacher nor Board has any control. At present relief is only offered in the case of 'the exclusion of certain children' under a notice from 'the Sanitary Authority under Art. 30.' But the concession yields the principle, and it is to be hoped that the effects of a specially severe winter will soon be recognised to be as much beyond the control of the teacher and Board as are the effects of an epidemic. The clerk of the weather is as little amenable to School Board control as are the merry microbes whose influence is recognised in the new Art. 30. This new power given to the Medical Officer of Health will really have little effect. It is very seldom indeed that a Board goes against this officer's advice, but it is probably better that he should have the power conferred upon him, limited, to be sure, by an appeal to the Department.

The change which gives 1st July to 30th June as alternative dates for the apprenticeship of pupil teachers is also to be commended. The natural time for the apprenticeship to end is a month or two before the Training College session begins. In connection with entrance to the Training College this Code does something towards relieving candidates under Art. 70 (*d*) 6 from the awkward position in which the last Code left them. They are now (Art. 95 (*a*)) distinctly recognised as eligible for admission to Training College. But even yet there is a point, in the case of female candidates, that requires clearing up. With the men the difficulty does not arise, as all male students get a scholarship, its amount being determined by the *Class* of their pass. In the case of female candidates the scholarship varies in amount according to rank on the merit list referred to in Art. 94. Suppose now a girl 'has obtained a Higher Grade Leaving Certificate in at least three subjects (of which one must be English, including History and Geography, one Mathematics, and one in an ancient or modern foreign language), and has obtained a satisfactory report in reading, recitation, and teaching,' she certainly 'may be reckoned as having passed the Queen's Scholarship and Studentship examination in the first class'; but how is she to be ranked among those candidates who have passed and been ranked at the ordinary examination? This matter needs careful looking into, in view of the fact that with a diminishing number of pupil teachers in the country, we are increasingly driven to recognise non-P.T. candidates.

Pages 38 to 43 of this Code are new to their present place. Up till this year the *Instructions to H.M. Inspectors as to Examination in Needlework* was an obscure document with a very limited circulation even among teachers of Sewing. The exercises to be worked on the day of Inspection were dimly known to the initiated, but this knowledge was the result of great diligence, we had almost written research. But now all that is worth knowing about the Sewing Schedule is placed here before us

in such plain terms that even a man may read and an inspector understand.

We are told in the appendix that the Third Schedule, Needlework, 'has been altered and re-arranged.' Whatever changes have been made are all in the way of simplification. Standards I., II., and III. remain unaltered: the others are made somewhat easier than before.

This is a subject about which we men are at once ignorant and selfish. There is no doubt whatever that female teachers are at present overburdened with 'preparation work' for Sewing. If the same work had to be done in any of our subjects there would be an immediate revolt. Since the overpressure does not affect us, we let things go. We have had occasion to look into the matter closely, and are assured on the best authority that the teachers of sewing have themselves to blame. The Directress of Needlework does not want teachers to prepare seams at home. In her 'notes' in the Code now before us, she says, 'The garments made by children in the lower standards should (as a rule) be cut out by girls in Standards V. and VI. In Standard IV. and upwards the children *must fix* their own work. The Directress is keenly alive to the danger of making instruction in needlework nothing more than the teaching of stitches, and she complains that teachers almost universally err in doing too much, thus not only wearying themselves but positively doing injustice to the pupils.

If this be so, why do ladies persist in injuring themselves by overwork? The reason may be found in a comparison an old Indian doctor used to make. 'Men and women,' he said, 'are like the horses and oxen I used to see in India. The oxen would work till they dropped—they represent the women. When the horses found themselves over-burdened, they kicked.'

So long as an impossible ideal of cleanliness and neatness is held before our sewing teachers, so long will they strive to attain it. They say that it's all very good for the Directress to say this and that, but when the Inspector comes to school and finds seams roughly done, badly fixed, and generally out of order, as they undoubtedly would be if children were made to prepare all their own work, a disagreeable remark in the report would at once drive them back to their old laborious methods.

There is an Association of Lady Teachers in Edinburgh which takes a deep interest in this sewing question. Why does it not organise a general acceptance of the principle that all children *must* do their own 'fixing' or 'preparing,' or whatever else is the exact word? No one teacher can afford to differ from her neighbours in a way that leads her to appear at a disadvantage compared with her fellows. But if a whole district loyally pledge themselves to make the experiment, no one can suffer if it fails, and the evil will be set right; while if it succeeds, the evil has disappeared.

The Code for Evening Continuation Schools contains even fewer changes than its bigger brother. The addition of the words *not being less than* 12 *hours in each case* in Art. 10 (*a*) seems very trifling. But, like most of My Lords' little emendations, this may mean a good deal. Yet, though the grant may suffer somewhat from the loss of a more or less numerous series of hours which do not 'in each case' reach the required 12, the loss cannot be justly objected to. Those preliminary eight or nine attendances with which the first few weeks of the session's register is paved, are like the broken shafts in the graveyard. They mark the tombs of might-have-beens. No doubt the whole principle of paying in pennyworths—the teacher taking all the risk—is emphatically not an ideal one; but, the principle once granted, the present additional turn of the screw is perfectly justifiable. A pupil who has put in less than 12 hours during a session cannot be said to have been a satisfactory pupil.

In 10 (*c*), which is new, we read the record of errors in two directions—the errors of starving and of stuffing the pupils. One subject is certainly starvation rations; five are surely enough to satisfy the keenest continuation school appetite. The Department act wisely in insisting on paying no grant on account of 'less than two or more than five subjects.' Arrangements ought to be made, however, to meet the case of advanced pupils studying a special subject.

The only other addition of any interest is 8 (*g*), which runs: 'The staff of the school must be sufficient to provide a teacher for every 40 scholars in average attendance.' This requirement involves no very great change in arrangements. It is exceptional to find a teacher with more than 40 pupils in an evening school. In the country, indeed, the difficulty is said to be to find not teachers but pupils. Yet the supply of teachers for such classes must soon come to be a problem. At present these continuation schools may be said to be taught by the assistant teachers of the ordinary schools. Can this continue? Can men, even young and vigorous men, teach well all day in school and in the evenings too? Even if their health can stand the strain, is it right to tempt young men to spend all their time in teaching at a period when their own minds require moulding, and their own culture deepening? Perhaps the word *tempt* is not the best to use. There is not always a temptation. From a very wide acquaintance with teachers of such schools, we find that the emoluments vary from zero up to £65. Naturally, zero is the saddest case of all. It comes about in this way. The class is formed; the turn-out is meagre, but the teacher is hopeful, enthusiastic—the rival dancing class will soon be over. The dancing class does come to an end, but its place is taken by a sort of home-spun golf. The continuation class belies its name, and ceases to be. The lowest actual payment we have come across is £8 for two hours a night for three nights in the week from October to April. During the first year many teachers made over £40, but those days seem over. The wealthy sixty-five pounder reports that his board have now undertaken the financing of his class—and he proposes to resign. Some boards do give a small bonus in order to guarantee a minimum salary, but though 'farming' is prohibited, it—or its equivalent—is certainly practised. The average salary for two hours in each of four nights of the week is certainly not higher than £20, probably under it.

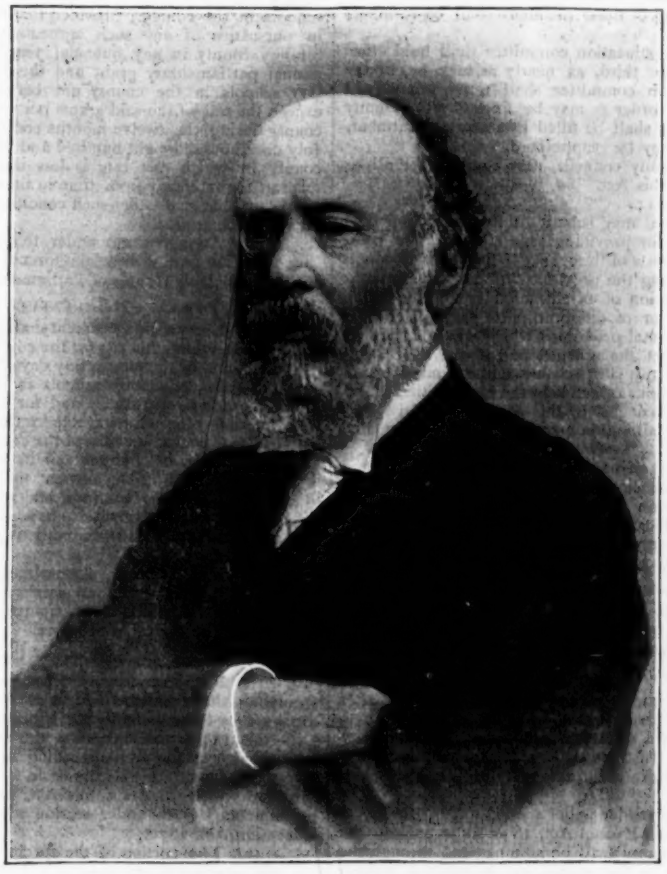
It may be thought that it is unkind to hinder assistants from increasing their small salaries by this very honest and very laborious method. But let the assistants examine carefully how this thing is going to work out. The evening school salary is getting to be regarded as part of the assistants' ordinary emoluments, and is very often used as an argument against increasing their day-school salaries. It is quite common to hear a member of a school board argue in this way. 'What have assistants to complain of? There's our Mr. So-and-so growling for an increase of salary. Would you believe it, that young man pocketed last year a cool hundred and ten pounds.' It does not seem to occur to such men that a man who works hard for £80 a year, and harder for the remaining £30 for his night work, must not be compared with another who gets, say, £90 for his day work alone. In advertisements, this dangerous confusion is becoming apparent. An appointment is represented as 'being worth,' say, £120, and it is not till enquiries have been made that intending candidates learn that they are expected to teach night and day for this sum, a part of which, after all, is not guaranteed to them. Young men are promised 'Continuation work,' as if they are being offered a gratuity. It is regarded as something thrown in, a steward's perquisite, a housemaid's 'chance.' This confusion of ideas must be set right. The Assistant Teachers' Association ought to keep a sharp look-out on this slumping of all sources of income. Nothing will do more to raise the salaries that they and we deplore, than to expose those salaries in all their gaunt nakedness.

The Second Election of County and Burgh Committees for the distribution of the sum available for Secondary Education under Section 2 (1) of the Education and Local Taxation Account (Scotland) Act, 1892, is the occasion of the issue of a Minute of the Committee of Council on Education in Scotland, dated March 27, 1896. The main point of interest in this minute and the accompanying circular (186) to County and Burgh Committees, is the endeavour they embody to attain to a greater degree of uniformity of action throughout the country. The circular tells us that 'under the original Minute of 11th August, 1892, the money available was to be distributed on the principle that the amount earned by each school should be determined mainly by the work done in that school, the schools entitled to share being selected by the Burgh or County Committee.' The ultimate settlement, however, was a Minute 'under which a proportionate amount was allotted to each burgh or county, to be distributed according

to a scheme drawn up for the approval of the Department, by each Burgh or County Committee.'

My Lords, and a majority of the Committees, think that 'the expediency of this plan is open to grave doubt. Accordingly my Lords have resolved, while preserving the system in the meantime, to promote as simple and uniform a principle as is possible in the distribution of the grant. To this end they intend to exercise their authority in regard to the approval of schemes in such a way as to avoid the dissipation of resources which is apt to follow from a variety of authorities acting without relation to one another.'

After warning all whom it may concern that my Lords do not guarantee any permanency in the existing or proposed arrangements, the Minute goes on to suggest a method by which the local authorities at present engaged in aiding Secondary Education by grants may become amalgamated with the existing Burgh and County Committees. If the County Council, Town Council, or other local authority by special resolution determines to entrust to these Committees the distribution or administration of any funds available, then such County or Town Council or local authority shall be entitled to elect as many representatives on the County or Burgh Committee as the Department may determine—the number so chosen not to exceed one-third of the whole Committee when completely elected.



THE RIGHT HON. SIR J. ELDON GORST, Q.C., M.P.

A second circular (187), this time to County Councils and other local authorities, brings this offer of special representation under their notice, and is 'confident that these Councils will agree that it is expedient, if possible, to bring the various sums available for Higher Education in each district under the supervision of a single Committee.'

It is greatly to be desired that this confidence may be justified, and that something like harmony may be maintained, not perhaps throughout the whole country, but at least within each county. Local needs no doubt vary in different districts; but there does not seem to be room in the same district for two, three, and sometimes even more different Committees acting on independent lines.

One great danger to education is that the existence of so many money distributing bodies may give rise to the belief that there is too much money going to education. Such a belief among County Councillors and Town Councillors may do incalculable harm, so teachers ought to do all they can to further the Department's desire for union. No doubt there is a lack of finality in the Minute. It bears evidence at all points of its temporary character. Probably at this time of change, with Sir John Gorst's Bill in the balance, none but tentative measures are possible. In the face of a vigorous educational policy at head-quarters, it may be well for the independent Committees to welcome union, lest a conflict of interests do serious damage to genuine progress in education.

SIR JOHN GORST'S EDUCATION BILL.

FROM the Vernal Equinox right up to the Dog Days, both the common man in the street and his more distinguished compatriot, the man in the House, to say nothing of that nonentity, the man in the school, will have daily concern with this item of the greater legislative attempts of the present Administration.

'A Bill to make further provision for Education in England and Wales,' is the official description of the measure which, as the title page informs us, was 'prepared and brought in by Sir John Gorst, Mr. Balfour, Mr. Chancellor of the Exchequer, and Lord George Hamilton.' Busy quidnuncs had long been exercising their prophetic powers in serving up forecasts for their admirers' edification; but here, as always, 'don't prophesy until you know' exactly applied; for, albeit the proposals are not all 'bolts from the blue,' there is much more in them than was dreamt of in the philosophy of these wiseacres, the exclusive information of the *Birmingham Argus* notwithstanding.

Already, from Land's End to the Cheviots, the Bill has been variously blessed and banned. It has been graphically described as a 'gag for the School Boards,' a 'halter for the Education Department,' and as 'an instrument for the painless extinction of Board Schools.' On the other hand it is regarded by many as merely half a loaf to be accepted on the usual grounds of being better than nothing at all in the shape of bread.

The N.U.T. Conference devoted three sessions to its examination, and men of all creeds and persuasions have delivered their pronunciamentos as to the wisdom or unwisdom of Sir John's bantling.

Mr. Acland tells us it is 'the greatest upheaval in the educational system which this country has ever seen.' In a great speech at Rotherham he asked, respecting the various clauses of the Bill, the very pertinent question, 'Will it make for education?' Mr. Acland's answer was almost an invariable negative, so that we are not surprised to hear that upon the motion, 'that the Bill be now read a second time,' Mr. Asquith, for the Liberal party, is to move as an amendment the addition of the ominous words 'this day six months.' To insist upon the importance of a proper study of such a measure to the practical teacher would be as much a work of supererogation as 'to paint the lily or to gild refined gold.' We hasten, therefore,

to give the text of the Bill, except Part III., which simply consists of definitions of terms and a schedule of repeal.

TEXT OF THE BILL.

Be it enacted by the Queen's most Excellent Majesty by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

PART I.

County Education Authority.

1. (1) Every county council shall appoint an education committee for the purposes of this Act, and the county council acting by that committee shall be and is in this Act referred to as the education authority for the county.

(2) The number of the members of the committee shall be fixed by the county council.

(3) The county council may appoint persons, whether members of the council or not, to be members of the committee, provided that a majority of those members shall be members of the council.

(4) A member of an education committee shall hold office for three years, and one third, as nearly as may be, of the members of an education committee shall retire annually at such time and in such order as may be fixed by the county council, and their places shall be filled by a new appointment, but retiring members may be reappointed.

(5) Two or more county councils may combine for all or any of the purposes of this Act.

(6) Provided as follows:

(*a*) A county council may submit to the Education Department a scheme for providing separate education committees for different parts of the county or for otherwise modifying or supplementing the provisions of this section so as to adapt the constitution of an education committee to the needs of the county or of different parts thereof, and for making any supplemental provisions which appear necessary for carrying into effect the scheme, and if the Education Department approve any such scheme, without modification or with any modifications agreed to by the council, the scheme shall have effect as if enacted by this Act, but shall be subject to revocation or alteration by a scheme made in like manner.

(*b*) Where a county governing body has been constituted for any county by a scheme made in pursuance of the Welsh Intermediate Education Act, 1889, the county governing body shall be the education committee for the purposes of this Act, and the county council acting through that governing body shall be the education authority for the county.

'To Supplement, not to Supplant.'

2. (1) It shall be the duty of the education authority to supplement and not to supplant such existing organizations for educational purposes as for the time being supply efficient instruction.

Technical Education.

(2) As from the beginning of the financial year next after the commencement of this Act:

(*a*) The powers of a county council as a local authority under the Technical Instruction Act, 1889, shall, except as to raising money, be exercised through the education committee, and

(*b*) So much of the residue under section one of the Local Taxation (Customs and Excise) Act, 1890, as is paid to the county fund of any county shall be administered through the education committee for that county, and be applied by them for educational purposes other than the provision or maintenance of elementary schools, and any question as to what are such purposes shall be determined by the Education Department, and

(*c*) Any portion of that residue not spent in any one year shall be accumulated, and may be used in subsequent years either as capital or as income.

School Attendance Committees.

(3) The education authority for a county shall act as, and be substituted for, the school attendance committee for every school district in the county for which there is for the time being no school board and which is not a borough other than a county borough, and the expense of their so acting shall be a special expense chargeable exclusively to the parishes for which they so act.

Pauper Children.

(4.) The powers of a county council in relation to industrial schools and reformatories shall, except as to raising money, be exercised through the education committee.

(5.) The education authority for a county and the board of guardians of any union may, with the approval of the Education Department and the Local Government Board, make a contract in relation to the care and maintenance of all or any of the children chargeable to that union, and on any such contract being made, such of the powers and duties of the Local Government Board and the board of guardians respectively in relation to those children as are specified in the contract shall be exercised by the Education Department and the education authority respectively.

Administration of Grants.

3.—(1.) The education authority for any county may undertake, on such terms as may be agreed on between the education authority and the Education Department, the administration on behalf of the Education Department of all or any of the duties of that Department in respect of all or any part of the money provided by Parliament for public education or for the Department of Science and Art so far as it is applied in aid of schools in that county and in respect of securing or certifying the efficiency of schools in the county; provided that the rate per scholar payable in pursuance of any such agreement to the education authority for any county in any financial year on account of the ordinary annual parliamentary grant and the fee grant to public elementary schools in the county not being evening schools shall not exceed the rate of the said grants per scholar in those schools in the county during the twelve months ending on the thirty-first day of July one thousand eight hundred and ninety-six, except that in any county in which that rate is less than twenty-nine shillings per scholar, the rate may from time to time be raised to an amount not exceeding that sum under such conditions as the Education Department may determine.

(2.) An agreement under this section shall not come into operation until it has lain for not less than one month on the table of both Houses of Parliament.

Powers of Education Department.

(3.) Every such agreement shall provide for the observance by the education authority for the county of the terms of the agreement, and of the elementary day school code, for the inspection of public elementary schools in the county by officers of the Education Department, and for the forfeiture of a portion of the sums otherwise payable to the education authority in the event of non-observance of the conditions of the agreement or of that code, or of any school in the county being pronounced by the Education Department to be in any respect inefficient, either as respects buildings, sanitation, playgrounds, staff, course of instruction, or otherwise howsoever, or to be not conducted in accordance with the conditions relating to a public elementary school.

(4.) The Education Department may on the recommendation of the education authority for any county modify any regulations of the Education Department so as to meet the special circumstances of that county.

The New Grant.

4.—(1.) For the assistance of public elementary schools requiring special aid there shall be paid in every financial year out of moneys provided by Parliament to the education authority for each county a special aid grant calculated at the rate of four shillings for each scholar who, during the preceding financial year, was either in a voluntary school in the county or in a school of any school board in the county which, but for this Act, would be entitled to a special parliamentary grant under section ninety-seven of the Elementary Education Act, 1870.

(2.) The portion of the special aid grant paid in any financial year in respect of scholars in voluntary schools shall be distributed by the education authority as special aid among the voluntary schools in the county in proportion to the number of scholars in those schools during the previous financial year, but the special aid for any school shall be reduced by the amount applied for the maintenance of the school during the said previous financial year from any endowment held in trust for the benefit of the school.

(3.) The portion of the special aid grant paid in any financial year in respect of the scholars in school board schools shall be applied—

(*a*) in giving to every school board any grant which becomes due to the board during that year under section ninety-seven of the Elementary Education Act, 1870; and

(*b*) in giving special aid for the schools of those or other poor school boards according as the education authority think aid is most required on account of poverty.

(4.) The special aid under this section for any school shall be applied in such manner as the education authority direct for the purpose of improving the teaching staff as regards

number, qualification, or salary, and so far as it is not, in the opinion of the education authority, required for that purpose, for all or any of the following purposes, namely, the payment of the teaching staff, the provision of special teachers whether on the permanent staff or not, the improved education of pupil teachers, and the improvement of the educational fittings and apparatus of the school.

(5.) If any surplus remains out of the portion paid in respect of scholars in voluntary schools, or of the portion paid in respect of scholars in schools of school boards, after special aid has been given for the schools as provided by this section, that surplus shall be applied by the education authority at their discretion, in such manner and for such object for the benefit of elementary education in their county (whether by way of helping poor schools or otherwise) as the Education Department may sanction.

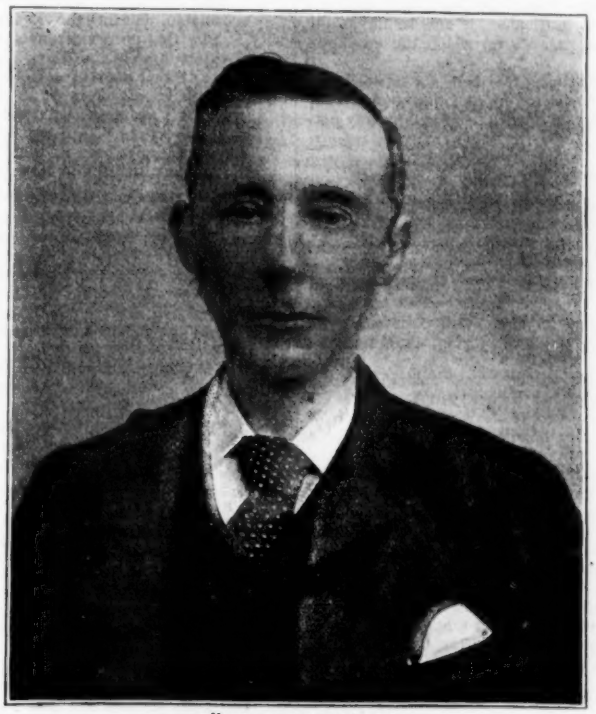
(6.) The special aid grant shall be paid quarterly or at such other times as the Education Department, with the approval of the Treasury, may direct.

Federation of Schools.

(7) Where any body of persons (hereinafter referred to as the association) satisfy the education authority that they are appointed by the managers of several associated schools within the county to act on their behalf for the purposes of this section, and apply to the education authority for the payment to them of the special aid for the schools so associated, the special aid shall be so paid, and form a common fund applicable for special aid for the associated schools, in accordance with a scheme approved from time to time by the education authority.

(8) The association may represent for the purposes of this section either all the schools, or all the schools of a particular religious denomination, in the county or any part of the county, or some of such schools.

(9) The education authority may, as they think fit, recognise one association or more than one association of schools of a particular religious denomination; and the Education Department may, on the application of the education authority, determine to what association of schools of any denomination any particular school of that denomination is to be deemed for the purpose of this section to belong.



A. H. DYKE ACLAND, M.P.

[*Photo by Bassano.*

Powers of Inspection and Audit.

(10) The education authority shall by such inspection and examination of the school and the scholars therein, or otherwise as they think necessary, ascertain that any special aid for a school is applied for the purpose or purposes specified in this Act for which it is given, and shall refuse any further payment unless it is so applied.

(11) The education authority shall refuse payment of the special aid for a school unless the managers of the school give all the information and aid that the authority require for the carrying into effect this section.

(12) This section shall apply only to public elementary schools which are not evening schools.

5. The accounts of every school aided out of the special aid grant, if not otherwise required to be audited by the district auditor, shall be so audited, and the enactments relating to audit by district auditors of the accounts of school board and their officers, and to all matters incidental thereto and consequential thereon, shall apply accordingly, with such adaptations as may be made by regulations of the Local Government Board.

Supervision of School Boards.

6. Where the Education Department would but for this section cause a school board to be formed for any school district, and have also published such notice in the district as is in the opinion of the Department sufficient to give an opportunity to apply in manner required by law for the formation of a school board for the district, and such an application has not been made within one month after the publication of the notice, the Education Department shall, instead of causing a school board to be formed, make an order imposing the duty of supplying the deficiency on the education authority for the county comprising the district, and thereupon the Elementary Education Acts shall apply as if the education authority were the school board for the district.

7. Where after any such notice an application is made for the formation of a school board in a borough, the Education Department shall by order declare the borough council to be the school board, and thereupon the council shall be the school board, but shall, except for the purpose of raising money, act, in the case of a county borough by the education committee, and in any other case by a special committee constituted in like manner as the education committee.

8.—(1.) A school board may enter into a provisional agreement for the transfer of their school or schools to the education authority for their county in the event of the school board being dissolved, and thereupon, if such application is made as is required by law for the dissolution of a school board, whether within the time limited for making such application or not, the Education Department may by order dissolve the school board, and constitute the education authority their successors, and all property of the school board shall by virtue of the order be transferred to and vest in the education authority for all the estate and interest of the school board therein, and subject to the rights and liabilities affecting that property.

(2.) Where in a district not having a school board such notice has been published as is in the opinion of the Education Department sufficient to give an opportunity to apply in manner required by law for the formation of a school board, and such an application has not been made within one month after the publication of the notice, the managers of any public elementary school in the district may, in manner provided by section twenty-three of the Elementary Education Act, 1870, transfer the school to the education authority for the county.

(3.) On any transfer being made in pursuance of this section, the Elementary Education Acts shall apply as if the education authority were the school board for the district.

9. Where the Education Department declare the school board for any school district to be in default or proceed as if the school board for a school district were in default, or declare that a school board for a school district have not properly performed any of their duties under the Elementary Education Acts, the Education Department may by order constitute the education authority for the county comprising the school district the school board for the district, and thereupon the Elementary Education Acts shall apply accordingly.

10. An education authority shall delegate their powers as a school

board for any school district in respect of the control and management of the schools to a local body of managers appointed—

(*a*) if the district is a county borough, whether united or not with any parish, by the education authority for the borough;

(*b*) if the district is a borough not being a county borough, whether united or not with any parish, by the borough council;

(*c*) If the district is co-extensive with an urban district not being a borough, by the district council;

(*d*) If the district is co-extensive with a parish, as to half by the parish council, or if there is no parish council by the parish meeting, and as to the other half by the education authority;

(*e*) In any other case as to half by the education authority, and as to the other half by such of the said local authorities and in such proportions as the education authority may determine.

Subject as aforesaid, section fifteen of the Elementary Education Act, 1870, shall apply in like manner as if the local body were managers appointed under that section.

11.—(1) All expenses incurred by the education authority acting as a school board for any school district shall be defrayed in the first instance as part of the expenses of the education authority, and shall be raised as expenses for special county purposes, and shall be charged exclusively to the school district, or, if and so far as the county council so direct, to all the parishes for which the education authority so act.

(2) All money borrowed by a county council for school board purposes shall be borrowed on the security of the county fund, but the loan shall be treated as a loan for a special county purpose.

Secondary Education.

12.—(1) The education authority, for the purpose of promoting education other than elementary, may, amongst other matters,—

(*a*) Aid any school to provide such education, or, with the consent of the Education Department, take a transfer of any school which provides such education and is not an elementary school; and

(*b*) establish a school, and for that purpose provide land and buildings, whether by purchase, hiring, or otherwise; and

(*c*) Establish and maintain scholarships or exhibitions; and

(*d*) Supply or aid in supplying teachers; and

(*e*) Make inquiries with respect to the sanitary condition of the school buildings (including boarding houses) of any school within their county; and

(*f*) make inquiries with respect to the education given by any school within their county, except a school which, in the opinion of the Education Department, is of a non-local character; and

(*g*) take such measures as they think fit for giving information to the public with respect to the result of such inquiries.

(2) For the purpose of improving the efficiency of the teaching staff, whether in elementary or in other schools within their county, the education authority may, with the consent of the Education Department, aid any establishment or organisation for the training of teachers.

(3) The Education Department, on the application of the education authority, or of a school board, may, if they think fit, make an order transferring to the education authority for any county any school, or department of a school, within the county maintained by a school board and providing education which, in the opinion of the Education Department, is other than elementary, and may embody in the order any incidental or consequential provisions for adjustment of rights or liabilities.

(4) The exercise of any powers under this section shall require in the case of an industrial, a day industrial, or a reformatory school, the consent of a Secretary of State, and in the case of a poor law school the consent of the Local Government Board.

(5) The county council may guarantee, for a term not exceeding five years, any annual or other periodical payment required for the purposes of this section, and may charge on the county fund any sum required to fulfil the guarantee.

(6) If the education authority make it a condition of giving aid under this section to any school that representatives of the authority be added to the trustees or other governing body of the school, and the trustees or other governing body assent to the condition, those representatives shall for all purposes be trustees or members of the governing body of the school.

(7) Nothing in this Act shall authorise the rate to be raised in any one year by a council for the purposes of this section, and of the Technical Instruction Act, 1889, to exceed the amount limited by that Act.

Further Power of Inspection, &c.

13.—(1) An education authority in the performance of their duties shall not, subject to the express provisions of this Act with respect to the special aid grant, give any preference or advantage to any school on the ground that it is or is not provided by a school board, or that it does or does not belong to, or is or is not in connection with, or under the managenent of any particular church, sect, or denomination, or that religious instruction is or is not given in the school.

(2) The education authority shall take care that every school receiving from them any money is inspected and examined by such persons and in such manner as may be approved by the Education Department with reference to the particular class of schools to which the school belongs, and shall satisfy themselves with respect to every such school—

(*a*) that the buildings are sufficient and suitable as regards size, sanitary accommodation, convenience, repair, and otherwise; and

(*b*) that the furniture, fittings, and school apparatus are adequate; and

(*c*) that there is an adequate staff of teachers; and

(*d*) that proper discipline is maintained, that the course of education is sufficient and suitable, that the fees, if any, are suitable, and that the teaching is efficient; and

(*e*) that proper accounts are kept showing the receipts and expenditure of the school; and

(*f*) that the school is conducted in accordance with such regulations made by or in pursuance of any statute, or made by the Education Department, as are applicable to the school.

(3) Every education authority shall make such report and returns and give such information to the Education Department as the Department may from time to time require.

Appeal to Education Department.

14. If the persons managing any school, whether as school board, governing body, trustees, managers, proprietors, or otherwise, feel aggrieved by the action of an education authority under this Act, they may complain to the Education Department, and that Department, after communication with the education authority, shall determine the matter, and the education authority shall comply with any order made by the Education Department with reference to the complaint.

15. If any education authority fail to perform any duty imposed on them by or under this Act, the Education Department may appoint any person to perform that duty, and the person so appointed shall for that purpose have the same powers and authorities as the education authority, and his expenses shall be defrayed as part of the expenses of the education authority.

Officers and Expenses of Education Authority.

16.—(1) The county council shall provide such officers, servants, buildings, furniture, and other things as are necessary for the execution of the duties of the education committee, and shall pay the expenses of executing those duties.

(2) The power of raising money for the purposes of this Act shall be vested in the county council, and shall not be exercised through the education committee.

(3) Any officer appointed in that behalf by the Education Department or the Charity Commissioners may attend any meeting of the education committee, and take part in the proceedings, but shall not have a right to vote.

(4) Save as otherwise provided by this Act, the enactments relating to the committees of a county council shall apply to the education committee, but the Local Government Board may make regulations for adapting the provisions with respect to expenditure and audit to the expenditure of a joint committee of two or more county councils.

Educational Endowments.

17.—(1) The education authority for a county shall for the purposes of the Charitable Trusts Acts, 1853 to 1891, be deemed to be persons interested in any educational endowment administered or applicable in their county.

(2) An education authority may submit proposals for a scheme under the Endowed Schools Acts, 1869 to 1889, with respect to an educational endowment administered or applicable in their county, and thereupon the Charity Commissioners shall proceed in like manner as with proposals submitted by a joint education committee under section three of the Welsh Intermediate Education Act, 1889, and that section shall apply as if the education authority were a joint education committee.

(3) The Charity Commissioners may, on the application of an education authority, make orders for adapting to the provisions of this Act the provisions of any scheme made by the Commis-

sioners, and any such order shall have effect as if it were part of the scheme.

18. Any regulations made by the Education Department for the purposes of this Act shall not come into force until they have lain for not less than one month on the table of both Houses of Parliament.

PART II.

General Amendments of Elementary Education Acts.

19.—(1) The amount of the ordinary annual Parliamentary grant given in any year to any public elementary school not being an evening school shall not exceed the amount per scholar given to the school in respect of the said grant during the twelve months ending the thirty-first day of July one thousand eight hundred and ninety-six, or the amount, in the case of an infant school or infant class, of seventeen shillings, and in any other case of twenty shillings per scholar in the school during the year in which it is given, whichever is greater.

(2) There shall be repealed, as respects England and Wales, so much of section nineteen of the Elementary Education Act, 1876, as enacts as one of the conditions for obtaining the annual Parliamentary grant that such grant shall not in any year be reduced by reason of its excess above the income of the school if the grant do not exceed the amount of seventeen shillings and sixpence per child in average attendance at the school during that year, but shall not exceed that amount per child, except by the same sum by which the income of the school derived from voluntary contributions, rates, school fees, endowments or any source whatever other than the Parliamentary grant, exceeds the said amount per child.

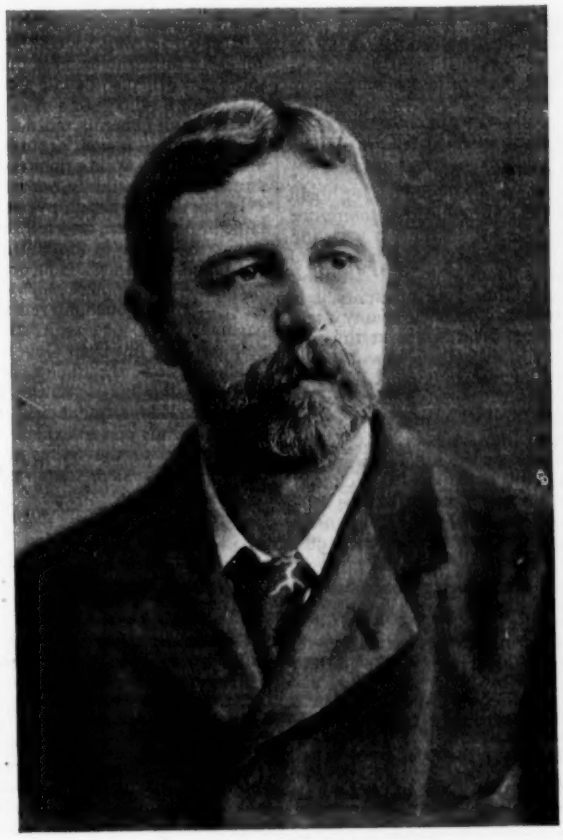
20.—(1) The amount of any rate which is assessed in a parish (whether by the overseers or by any other authority) on the occupier of the schoolrooms, offices, and playground of a public elementary school shall be paid by the overseers of the parish, and be obtained by them out of the fund out of which the expenses of the school attendance committee are paid, or if the school is within the district of or maintained by a school board, out of the local rate out of which the expenses of the board are paid, and shall be so obtained whether by deduction from any sum payable by them, or otherwise, in such manner as may be provided by general orders of the Local Government Board.

(2) Where any authority from whom the amount of a rate is obtained under this section pay part only of the expenses of the school attendance committee or school board, they may, whether they are or are not themselves the overseers, deduct the amount from any sum payable by them to the school attendance committee or school board.

(3) A rate in this section means a rate the proceeds of which are applicable to a public local purpose.

21. On and after the first day of January one thousand eight hundred and ninety-eight the Elementary Education (School Attendance) Act, 1893, shall have effect as if 'twelve' were substituted therein for 'eleven':

Provided that this section shall not apply in the case of any child who at the said date is, under the byelaws then in force in the school district in which he resides, exempt, wholly or partially, as the case may be, from the obligation to attend school.



J. H. YOXALL, M.P., *Secretary*, N.U.T.

[*Photo by M. Atkinson.*

22. The restriction contained in section one of the Technical Education Act, 1889, on supplying or aiding the supply of technical or manual instruction to scholars receiving instruction at a public elementary school shall not prevent the attendance of such scholars at instruction given to other persons, nor prevent the use, for the purpose of giving technical or manual instruction to such scholars, of any building or apparatus belonging to an education authority, if the building or apparatus is not used for the general purposes of an elementary school.

23. For the purpose of the fee grant under the Elementary Education Act, 1891, and of this Act, average attendance shall be calculated in accordance with the elementary day school code.

24. The guardians of any union may contribute towards such of the expenses of providing, enlarging, or maintaining any public elementary school as are certified by the Education Department to have been incurred wholly or partly in respect of scholars taught at the school, who are either resident in a workhouse or in an institution to which they have been sent by the guardians from a workhouse, or boarded out by the guardians.

25. The persons having power to borrow money for the purposes of a public elementary school maintained by a school board or held on a charitable trust, may borrow that money from a county council, and a county council may lend any such money, and may if necessary, without the sanction of the Local Government Board, and irrespectively of any limit of borrowing, raise the money by loan, subject to the like conditions and in the like manner as any other loan for the execution of their duties, and subject to any further conditions which the Local Government Board may by general or special order impose:

Provided that where money is borrowed under this section on the security of a school site or school house the site or school house shall not be sold for the purpose of enforcing the security except to—

(*a*) a school board; or

(*b*) an education authority acting as a school board; or

(*c*) persons who undertake to carry on the school as a public elementary school.

26. A school board for a district shall not without the consent—

(*a*) if the district is a borough, whether united or not with any parish, of the council of the borough; and

(*b*) if the district consists of any parish or parishes co-extensive with an urban district not a borough, of the council of the district; and

(*c*) in any other case of the county council of the county comprising the district;

receive from the rating authority, in any school board year, a sum for the annual maintenance of the public elementary schools provided by the board, not being evening schools, in excess of the higher of the following limits, namely—

(*a*) the sum to which the existing rate per scholar of annual maintenance, when multiplied by the number of scholars in the public elementary schools provided by the Board, not being evening schools, during the previous school board year amounts; or

(*b*) a sum equal to twenty shillings per scholar in those schools during that year;

and the existing rate means the rate per scholar in the school board year ending next before the passing of this Act of the annual maintenance of the schools, together with such addition as is necessary

for including the increase in annual maintenance caused by such automatic rise of salaries, or such pensions or other allowances to superannuated teachers as may arise under any scale in force on the thirty-first day of March, one thousand eight hundred and ninety-six.

For the purpose of this section 'annual maintenance' means, in relation to a school, not an evening school, the annual cost incurred on account of the school for the salaries, allowances, and emoluments of the teachers, for any pensions or other allowances given to superannuated teachers, and for insurance, fuel, lighting, books, and stationery, and for repairs, whether of buildings or furniture; and 'school board year' means the year for which the accounts of a school board are made up.

27.—(1) One of the regulations in accordance with which a public elementary school is required to be conducted shall be that if the parents of a reasonable number of the scholars attending the school require that separate religious instruction be given to their children, the managers shall, so far as practicable, whether the religious instruction in the school is regulated by any trust deed, scheme, or other instrument or not, permit reasonable arrangements to be made for allowing such religious instruction to be given, and shall not be precluded from doing so by the provisions of any such deed, scheme, or instrument.

(2) Any question which may arise under this section as to what is reasonable or practicable shall be determined by the Education Department, whose decision shall be final.

Part III. contains definitions, and there is also a schedule of practical repeal.

EXAMINATION OF THE CLAUSES.

Clause 1. *Education authority: Shall it be elective?*—Round this clause will be an uncompromising contest. Should the Bill become law in its present guise, the education committee would practically be a body irresponsible to the electors, and all but a majority of its members need never face the music of a municipal heckling, or fear being brought to task let their folly be never so great. To remedy this state of affairs it is proposed to have an education authority for each county area, which must be elected just as School Boards are at the present time. As the only objection to this course appears to be a disinclination to further increase the number of elected bodies, it may be hoped that Sir John Gorst will be able to give way, and so materially improve his Bill, and what may perhaps be of equal importance, disarm opposition and prevent future reprisals, for it is certain that so soon as the Liberals win their way back to office immediately will this and many other clauses of the Bill go. Not only do the teachers say this, but the self-same doctrine is held by many supporters of the Government. Thus, Mr. Courtney, speaking at Liskeard on April 9th, said:—

The Bill began by setting up in every county an educational authority. Every county council would have to establish a committee which might come to an agreement with the Education Department to take over the work of that department and administer it. He looked upon that as a case in which they might raise the previous question whether the particular body proposed to be appointed was the best possible, and in connection with this it was impossible to avoid noting that the National Union of Teachers had, by 14,000 votes to 9,000, agreed that the county authority should be a body elected directly by the ratepayers—a sort of county school board.

The Tory papers shy at the importance given to the County Councils by Sir John Gorst's proposals:—

It will be necessary to learn with exactness the powers that are to be conferred upon the County Councils before determining upon the advisability of bestowing those powers upon them, or before attempting a forecast of the probable effect of this vast change in our educational system.—*Morning Post.*

The vagaries of County Councils are not calculated to gain approval for any scheme that would add still farther to the powers of those bodies; moreover, the administration of the Act by them would be likely at times to place the County Councils and the Board School authorities in open conflict.—*Evening Standard.*

Henceforth education, like local government, is to be consigned to the local amateur. . . . Radicals, who think County Councils capable of making new heavens and new earths, and are always anxious to enlarge the powers of these beneficent bodies, should be delighted. For our part, we are not in favour of extending the sphere within which government by amateurs rages. This part of the Government Bill will require, and receive, a good deal of criticism from friends and opponents alike.—*St. James's Gazette.*

When we come down to the simple question of how this gigantic education reform is to benefit the voluntary schools we have to confess that we feel somewhat nonplussed. Broadly speaking our experience is that, while the Education Department of the Government has dealt fairly with the voluntary schools, the local authorities have been generally hostile. The Bill makes the Department a mere central office, and places all power in the hands of local authorities. They have power to help, but also, we fear, power to hinder and harass, by means of the very large authority conferred upon them. Even inspection will cease to be Imperial, and become local.—*Birmingham Gazette.*

Even the Church Press looks askance at these proposals:—

Nor are we at all sure that the bodies which it is proposed to invest with educational functions—the county and borough councils—can in all cases be trusted to work the Act in a satisfactory manner.—*Guardian.*

Clause 2. *To supplement, not to supplant.*—This clause will not meet with much serious opposition, howbeit the clauses which follow do not tend to bear out the principle of supplementing so much as the disowned doctrine of superseding, especially in the case of School Boards. It will not, however, be round this clause that the concentration of School Board opposition may be expected to gather.

Respecting the "whiskey money" it will be counted to Sir John for righteousness that at length County Councils are to be compelled to devote the whole of this to education, yet even here lie the germs of a pretty quarrel, for it is secondary education in general, and not the technical phase of it, which is to receive benefit from this reform. A well supported amendment to appropriate the money solely to technical instruction will certainly not fail to be forthcoming.

In his determination to put pauper children away from the taint of pauperism, and reformatory scholars from the brand of crime, the mover of the Bill has again scored, and will receive commendation in place of opposition.

Clause 3. *Devolution of powers by the Education Department.*—Here is encountered the 'halter for the Education Department,' and once again strenuous opposition, not only from political foes, but from Government supporters too, may with safety be predicted. We opine that when the Queen is called upon to affix her signature to the Bill, the suicide of the Education Department will not be nearly so complete as Clause 3 leads one to expect.

Again, as to the fixing of a limit of 29*s.* per head, the following figures are somewhat instructive.

Rate of Grants (including Fee Grant) per head throughout England.

In Board Schools	£1 9 0
In British and Undenominational	1 8 7
In Church of England	1 8 4
In Roman Catholic	1 8 1
In Wesleyan	1 8 0

So that whatever additional financial burdens progressive education may thrust upon schools, the Board Schools, having reached Sir John's maximum rate of grant, can hope to receive no further assistance in the shape of grants. Thus, supposing Varied Occupations be again made a compulsory subject, the additional expenditure inseparable from such an innovation could only be met by an increased rate. The same reasoning applies to the alternative Drawing syllabus, the adoption of which would entail an expenditure of from £50 to £60 in very large schools. As to inspection, one is altogether in the dark. It appears that we are to go back to the days antecedent to 1870, and once again employ denominational inspectors. What will become of the present staff of grant assessors the Bill fails to indicate.

Power to modify the Code so as to make it more applicable to local needs may mean the reduction of the curriculum to the bare limits of the three R's, or it may foreshadow the judicious shaping of the regulations to the material benefit of the locality. This would depend upon the Education Committee; and once again the vital necessity for the utmost care in the constitution of that body is emphasised.

Clause 4. *Further financial aid.*—On this point unanimous disagreement is again encountered. The grant is totally inadequate, say some, and most difficult would it be to refute this statement. It should be given to all schools alike, is argued in most influential quarters. Mr. Courtney in advancing this view, also suggests that the additional grant in the case of School Boards should be earmarked for the reduction of

the rate. It is also very pertinently argued that sufficient safeguards are not introduced to ensure that the special grant should not be a relief to subscribers instead of a benefit to teachers in voluntary schools, and a means to improvement of apparatus and staff therein. This part of the Bill will indubitably meet with both opposition and attempts at amendment from all quarters of the House. And last, but far from being least, comes the point that the grant is to be indiscriminately given to *all* voluntary schools, so that the well-to-do will become rich whilst the poverty of the worse-placed schools will be by no means removed. The force of this argument is undeniable, and it is in no way met by the federation of schools which is recommended in sub-section 7 of this same clause. Concerning this same federation there is some amount of conflict of opinion. Mr. Diggle, indeed, has most strongly urged the adoption of this principle long before the appearance of Sir John Gorst's Bill, and to some extent it has already been acted upon. If we seek to enlighten ourselves from the past action of these federations we are face to face with the teachers' contention that federation has tended to starve and sweat teachers, and to promote autocracy of the worst kind. It is true that Mr. Rankilor, of the Birmingham federation, at Brighton, very eloquently urged the contrary; but Birmingham is not England, and the federation of the capital of the Midlands perhaps could not fail to catch some portion of the admirable educational spirit which so largely prevails in that district.

ERNEST GRAY, M.P.

[*Photo by M. Atkinson.*

The Manchester federation was charged with quite an opposite tendency, and the charge was not repudiated. Mr. Gray, M.P., whilst admitting the evil wrought, and not, alas, for want of thought, by the average federation, yet claimed that federation *per se* was most desirable, proper safeguards being provided. Then comes the question how? "Board Schools," Sir G. Powell was quick to advance in opposition to Mr. Yoxall's denunciation of federation when Sir John Gorst made his statement on the 31st ult., "are nothing but a gigantic federation." Admitted, but here there is no doubt either the existence or the efficacy of the safeguard, whereas who shall manage the managers in the case of a non-elective and irresponsible federation.

Clause 5. *All school accounts to be audited.*—This clause, unlike most of its fellows, is absolutely uncontentious.

Clauses 6–9 are the parts of the Bill which are supposed to aim at the painless extinction of School Boards. They call for little comment, for supposing an elective body to be existent in every county to whom educational affairs are entrusted, having universal school boards, we could view with equanimity the disappearance of the older type of Board with a limited area of control. Failing this reform, however, it will be counted as loss whenever a School Board shall cease to exist or be prevented from coming into existence. Universal School Boards with co-opted membership to the extent of anything short of an absolute majority will certainly fail to command as much confidence as is reposed in the Boards as at present constituted. Consequently, the fate of these clauses is practically wrapped up in that of the 1st.

Clause 12. *Higher Grade Schools.*—According to this clause the school authority may, with the consent of the Education Department, take over the Higher Grade Board School even against the will of the School Board. This has already been most strenuously opposed, and the least that may be expected by way of amendment is the substitution of 'and' for 'or,' so that the clause will read, 'on the application of the education authority *and* of the School Board,' which was indeed the impression given by Sir John in his introductory statement.

Passing now to Part II., on the very threshold is encountered another piece of very debateable ground, to wit, the abolition of the 17*s.* 6*d.* limit.

Clause 19.—*Abolition of the* 17*s.* 6*d.* *limit.*—To this much objection will be raised by both Voluntaryists and School Boardists. It is argued that the special grant will deaden the desire to subscribe, and that there will be needed some inciting force to neutralise this tendency, for which purpose the 'limit' is admirably adapted. Secondly, the abolition, it is contended, will cause over-pressure in small schools which now omit special subjects, but will be compelled to take them, when, let the subscription list be never so small, the full amount of 20*s.* 6*d.* per head may be earned. In this connection, be it noted that the N.U.T. Conference condemned the abolition, and that Mr. Geo. Dixon has already intimated his resolve to move an amendment in the House to provide safeguards for the non-falling-off of subscriptions. We mention this latter because we incline to the belief that Mr. Dixon's suggestion will point the way out of this 'limit' difficulty. Granted a certain minimum of subscriptions, then the limit shall be of non-effect; but, in the case of schools falling below this, the limit shall as at present apply.

Clause 20.—*School-rating.*—The one thing to aim at here is the equal treatment of the two classes of schools, and it is to be hoped that Sir John Gorst may be brought to accept the N.U.T. amendment, which will bring this about in such a way as to make it possible for the schools to be still let out for various purposes as at present. The amendment reads as follows:—'The exemption of all school premises from the payment of rates by the respective authorities, should not involve the payment of those rates out of the Local School Board Fund.' As the Bill now stands, it means exemption for Voluntary Schools with no corresponding benefit for the Board School.

Clause 21, which raises the age of juvenile labourers from eleven to twelve, is a proof of Sir John's tenacity of purpose, as well as of his realisation of the heinousness of sending children too early into the workshop.

Clause 22 is a suitable suggestion which has, in not a few cases, been already anticipated, and wisely so.

Clause 25.—*Borrowing powers.*—That Voluntary School managers should have the power to raise loans on the

security of the school premises will not meet with much opposition.

Clause 26.—*Proposed limit of the School Board Rate.*—We do not think it possible that the School Board shall be condemned to go hat in hand to the County Council, asking that its claim for money may be allowed. We could fill pages with protests from all sections of the press and from all shades of politics in which, more or less forcibly, is expressed distrust of the County Council and disapprobation of this humiliation of the School Boards. Mr. Geo. Dixon, whose position as Chairman of the Birmingham School Board on the one hand, and as a supporter of the Government on the other, cannot but have great weight, thus expresses himself concerning this much-to-be-opposed provision :—

SIR W. HART DYKE.

'And what of the new authority so far as it touches School Boards in the towns? Do you welcome its appearance, Mr. Dixon?'

'My objection is'—came the emphatic answer—'that there is the power of checking School Board expenditure vested in the Council. I strongly object to that. I object to it because members of School Boards are, as a rule, men who not only take an interest in education, but who know its details and the best methods. I also say that the County Council, whose function it is to prevent the money being spent, is not only lacking in that knowledge, but will not be able to obtain it or to hear even what the Boards have got to say for themselves, because the members of School Boards do not sit on County Councils. The Bill is, therefore, putting an important duty into the hands of people who know nothing about it. The Boards are charged with extravagance. But every three years they go out of office. Isn't it for the ratepayers to say if they are spending too much? They are elected for one specific purpose. The County Councils are elected for a score of different objects. Take our Council. We have sixteen or seventeen different committees, and I can assure you that it requires a very special business training for the man who goes in for any part of our municipal work. Each committee wants money for its own purposes. One active councillor wants markets, another roads. If we are to be put under their thumb, what will it mean? Say we require another £5,000 a year for teachers' salaries. "O! no," the cry will be; "they are spending more than my committee already. We want the money for baths and washhouses, or something else." Now, would those councillors, do you think, be capable of judging as to our requirements?'

'Then what do you recommend?'

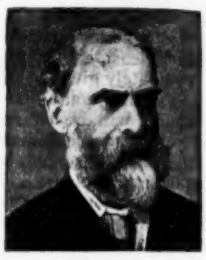
'I am in favour of leaving things as they are now. My reason is that this is one of the most important questions before the country, and you must not trifle with it. The country gets ample returns for its expenditure. Therefore I shall oppose it altogether.'

'The alternative suggested is for you to dissolve the School Board altogether, and ask the Council to take you over, is it not? Do you think many Boards will do that, Mr. Dixon?'

'No, not in the towns. The time has not come for that. The School Boards have more work to do yet. But what *would* happen, if we were put under the thumb of the Councils, is that the men whose heart is in the schools, and who see the work and the hopes of their lives destroyed, these men would resign. Do you suppose I would keep my seat on the Board if it was made impossible for us to carry on our policy? I could not do that.'

'Another proposal,' continued Mr. Dixon, after a moment's pause, 'is that the new education authority, which will be charged with technical education, shall absorb all teaching in our schools that is above the three R's. We have established a seventh standard school in the Waverley Road, where for boys who want to be artisans we have technical training, for others artistic, for others modern languages. We have watched it and tested its work with extreme care before building a similar school on the other side of the town. Now we shall not be able to build another. We shall have control up to the sixth standard, and no further. At present we can work the lower standards in unison with the higher. With the divided authority there will be an end of this. There will be friction and difficulty here, even if we hand over our present school, as perhaps we shall be tempted to do.'

Clause 27.—*Religious Teaching.*—This is the clause which has been propounded to meet the bogus religious difficulty. Were it not for the seriousness of the business, nothing could be more ludicrous than that all this polemical pother should be engendered by a difficulty non-existent, as all but ultra-zealots freely admit. Yet weeks will be spent in squabbling over this 27th clause, which the teachers do not want, which the Nonconformists loathe, which the level-headed Churchman does not want; indeed, the *Church Times* fears that it will be the death-blow to the Voluntary system. We fear that this clause will become part and parcel of the Bill; but we trust that it will at least clearly be laid down that teachers are not to be appointed because of their particular sectarian views. Nothing could be more fatal to education. If ministers care to take the trouble to come to school to teach their sectarianism, let them do so by all means; but have they time and have they inclination to do so?



J. BRYCE, M.P.

Before the Bill becomes law, an attempt will be made to embody therein clauses giving right of appeal to the Education Department, and also prohibiting compulsory extraneous duties. What the measure will be like when it emerges from the Committee stage, and finally becomes law, will depend upon the complaisance of the Government and upon the tactics of the Opposition. Backed up by the Irish Members, and with a colossal majority of their own, the Government can carry the whole Bill just as it stands. We do not believe they will try to so use their giant strength, but rather we incline to the opinion that important concessions may with confidence be expected.

NOTES ON 'LA GRAMMAIRE.'

BY W. T. THOMPSON, B.A. (LOND.).

(*First Class French Honours.*)

By the kindness of the proprietor of the English publishing rights of this charming little comedy, we are enabled to publish additional notes on this work, which, as our readers will be aware, is prescribed for the CERTIFICATE EXAMINATION THIS YEAR. Our object in publishing these notes is to render it easier for the large number of our readers who are entering for this examination, and who have few opportunities of securing adequate tuition in French, to pass a creditable examination in the subject.

The numbers quoted refer to the lines and pages of M. G. PETILLEAU'S excellent edition, which is published by HACHETTE & Co., 18, King William Street, Charing Cross (paper, 9d.; cloth, 1s.).

Our readers will find, we believe, that the notes given in this edition, together with the notes we are publishing, will supply them with the maximum of the assistance needed for studying this work.

SCENE 4.

10. 14.—*Que mon père sera heureux!* how pleased my father will be! *Que* commencing a sentence with an indicative verb = how! But *Que de!* = how much! how many!

10. 25.—*manche de couteau*, knife-handle. *Un manche* = a handle; *une manche* = a sleeve.

10. 32.—*Croyez-vous qu'il guérisse?* Do you think he will get better? The subjunctive is used after an interrogative which does not express a certainty.

11. 2.—*Nullement*, in no way. In general, adverbs of manner are formed from adjectives by adding *ment* to the fem. sing. adj. There is an etymological reason for this. *Ment* was originally a feminine substantive (L. *mens*) = 'manner,' and as such required a feminine adjective. Thus

nullement was originally *nulla mente*, in no manner, in no wise.

11.3.—*le voilà bientôt d'age à se marier*, he will soon be old enough to marry (lit. behold him soon of age to marry). *Se marier* = to get married. But *marier* as an active verb is used of the parents who make a marriage for their children, or of the priest who performs the ceremony.

11.8.—*Est ce qu'il viendrait?* Is he coming, perhaps? The subjunctive is often used in this dubitative sense.

SCENE 5.

Betterave, beetroot. From *bette*, beet, and *rave* (L. radix), radish, root.

12.3.—*je lui ai demandé un de ses choux*, I asked him for one of his cabbages. Notice that in French, *demander* takes a *direct* object of the thing asked for, and an *indirect* object of the person asked.

12.8.—*C'est un électeur*, He is a voter. *He is, she is*, are translated by *c'est* before (1) a noun, (2) a pronoun, (3) a superlative.

12.10.—*Il faut savoir prendre les masses*, One must know how to cajole the masses.

12.17.—*tu la feras cuire*, you will get it cooked (lit. 'cause it to be cooked'). *Faire* followed by the infinitive of another verb = to cause. The infinitive following it is active in French, not passive as in English.

12.20.—*fond-milieu*, centre-back, *i.e.* middle of the back of the stage.

12.22.—*Tout en promenant mon chou*, while trotting my cabbage about. *Promener* = take someone for a walk or excursion. *Se promener*, to go for a walk (lit. 'to take oneself out').

12.23.—*à ce que m'a dit Machut*, on what Machut said to me. After *ce que* the predicate is placed first, and the subject last.

12.24.—*puis*, then. Do not confound *puis*, then (L. *post*), with *puis* from *pouvoir*, to be able.

13.3.—*tantôt—tantôt*, sometimes—at other times. *Tôt* is usually used in compounds (*bientôt, tantôt, plutôt*).

13.6.—*Ça va très bien*, there is no trouble.

13.7.—*À la campagne, c'est prétentieux*, In the country, it is looked upon as giving oneself airs.

SCENE 6.

13.23.—*pour te remettre*, to hand over to you. When an infinitive denotes purpose, it is always preceded in French by *pour*.

14.7.—*Moi, j'avais mis un t*, I had put a *t*. *Tion, sion*, have the same sound in French. Hence *Caboussat's* confusion between the choice of *s* and *t* in his spelling.

14.11.—*vue*, sight. *Vue* is really the fem. past part. of *voir*. Many French abstract nouns derived from verbs are formed in this way, as *avenue* (*avenir*), *battue* (*battre*), *tenue* (*tenir*). Many too are formed in a similar way from past participles now obsolete, as *vente* (*vendre*), *pente* (*pendre*), *dette* (*devoir*), *élite* (*élire*).

SCENE 7.

14.25.—*vers*, prep. towards (L. prep. *versus*, towards). But *vers*, noun, m. s., a verse, a line of poetry (L. noun, *versus*, a line), and *vers*, the plural of *ver*, worm (L. *vermis*).

14.28.—*Il y a longtemps que je désirais*, for a long time I had wished.

15.1.—*canton*. There is no word exactly corresponding to this in English. Translate by 'district.' The *commune* is the unit of local government in France. The *canton* is formed of a number of united *communes*, the *arrondissement* of a number of *cantons*, and the *département* of a number of *arrondissements*.

SCENE 8.

16.16.—*n'en a pas*, has none.

16.20.—*a dû passer par ici*, must have passed this way.

17.4.—*rangé*, steady.

17.30.—*je ne dore plus* for *je ne dors plus*. The former means 'I gild no longer' (*dorer*, to gild); the latter, 'I sleep no longer'; 'I cannot sleep.' As the *s* of *dors* is not here sounded in French, the pronunciation is identical with that of *dore*.

18.4.—*je devais vous le dire*, it was my duty to tell you it.

18.9.—*il m'a semblé reconnaître*, it seemed to me that I recognised.

18.10.—*ça sent le romain*. See 11.27.

18.11.—*À bientôt*. This is an elliptical expression meaning, 'I hope to see you again soon.'

SCENE 9.

18.17.—*je dois, depuis longtemps, une visite*, I have been owing a visit for a long time. The present tense is used in French, as the visit is *still* owed.

18.24.—*s'il se présentait*, suppose there presented itself, *i.e.* 'suppose there was offered.' *Il* is used here in an impersonal sense.

18.26.—*jamais de liqueurs*, lit. 'never any spirits,' *i.e.* 'he never takes any spirits.'

19.5.—*je ferai tout ce que tu voudras*, I will do all that you wish (lit. 'will wish'). The future is used here in French, as a future time is referred to.

19.6.—*je désire que tu sois heureuse*, I wish you to be happy. *Désirer* is followed by the subjunctive, as it expresses a wish.

OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

BY ARTHUR T. FLUX,

Head Master of the Belvedere Pupil Teachers' Centre, First on Scholarship List, Author of 'Scholarship School Management.'

PUPIL TEACHERS' COURSE.

1. FOR APRIL 1897.—FIRST MONTH.

To suit the needs of several enquirers, it has been decided to start a Course for the April Examination in addition to the one now running for October.

WORK TO BE PREPARED.

A.—*English.*

First Year.—Text Books—Grammar. Daniel or Beach. 'Gray's Elegy in a Country Churchyard,' 'Chambers' Reprints.'

1. Learn good definitions of the parts of speech.
2. Learn the Anglo-Saxon Noun Suffixes.
3. Prepare the first four verses of the 'Elegy,' meanings, derivations, etc.

Second Year.—('The Task,' Bk. IV., 'Chambers' Reprints.)

1. The Noun—Classification, number, person, gender, case. Note especially the various kinds of case—nominative of address, absolute, etc.
2. Learn one-fourth of the Latin Prefixes, with examples.
3. Prepare lines 1–40 of the 'Winter Evening.' Meaning, derivations of important words, etc. Be prepared to paraphrase any part.

Third Year.

1. Learn the rules by which words of Anglo-Saxon origin may be detected.
2. Revise the Latin Prefixes.
3. 'Julius Cæsar,' Act 1, Scenes I. and II.

B.—*Arithmetic.*

First Year.

Boys.—Lock, Chap. III. Read and work Examples up to page 67. (G.C.M. and L.C.M.)

Girls.—Dixon and Beach. Work Miscellaneous Tests 'B,' page 53.

Second Year.

Boys.—Lock, Chap. X., pages 165 to 174. Read up and work all Examples.

Girls.—Dixon and Beach, Chaps. XII.–XIII. Read carefully and work Examples.

Third Year.

Boys.—Lock, Chap. XVII. Square Root. Learn and work all Examples.

Girls.—Dixon and Beach, Chap. XX. Read and work Examples.

C.—*Music.*

First Year.—The Common Major Scale, structure and intervals.
Second Year.—First Removes of Key.
Third Year.—The Minor Scale and its various forms.

D.—*Spelling.*

Learn 50 words per week from 'Words Commonly Misspelt.'

E.—*Geography.*

Africa.—General Facts, Physical Features, Productions, Climate, and Peoples.

(P.T.'s will find 'Africa,' by Meiklejohn, price 4d., a very useful little book, especially if it is interleaved.)

The amount of Geography to be prepared during the year is very great, and students should grasp the importance of setting to work in earnest at once, and preparing each month's work thoroughly. If it is allowed to accumulate it will never be done.

F.—*History.*

WILLIAM AND MARY.

Chief points :—

Week 1.—William and Mary's claim to the throne, completion of Revolution, reduction of Scotland. Note.—Massacre of Glencoe.

,, 2.—Reduction of Ireland : The Darien Scheme.

,, 3.—Parliaments : Bill of Rights, Toleration Act, Triennial Act, Treason Bill, Mutiny Bill, Act of Settlement.

,, 4.—War with France, Character of King, Government by Cabinet, Bank of England and National Debt.

G.—*Euclid.*

Second Year.—Book I. Definitions, Axioms, and Postulates.
Third Year.—Book I. Propositions 27, 28, and 29, and three deductions per week.

H.—*Algebra.*

Third Year.—'Scholarship Algebra.' Read Chaps. 1–4, and work all examples thereon.

I.—*Teaching.*

Second Year.—'Scholarship School Management.' First half of Chap. I.
Third Year.—'Scholarship School Management.' The Teaching of Grammar.

QUESTIONS TO BE ANSWERED.

1. Penmanship.—Write as specimens of :—
Largehand : Alphabetically, Biography, Cyclostyle.
Smallhand : 'The ploughman homeward plods his weary way.'
(Get a good copybook—Nelson's 'Royal Star,' Nos. 3 and 8—and practise a few minutes each day.)

2. Write an essay each week, selecting from—
Friends—War—Navy—Railways—Weapons of War—Newspapers—Happiness.

3. Notes of Lessons. (A criticism lesson must be given each week.)
Water—Oak Tree—Bees—Chalk—Lakes—A Sovereign—Paper.

4. *First Year.*
Analyse a verse of the 'Elegy' each week.
Parse these words :—*Homeward, all* (6), *air* (6), *save* (7), *that* (9), *such as* (11), *near bower* (11).

Second Year.
Paraphrase and analyse the following passages, and parse the words given :—
(*a*) Lines 1–11. Parse line 9.
(*b*) Lines 12–22. Parse *as* (12), *yet* (13), *messenger* (13), *perhaps* (14), *fast as* (19).
(*c*) Lines 23–36. Parse line 35.
(*d*) Lines 37–42. Parse 'Let fall the curtain,' 'that cheer but not inebriate.'

Third Year.—'Julius Cæsar.'
Paraphrase and analyse :—
Act 1, Scene 1.
'It is no matter . . . servile fearfulness.'
Act 1, Scene 2.
'Therefore, good Brutus, be prepared to hear
. . . hold me dangerous.'
Act 1, Scene 2.
'Why, man, he doth bestride the narrow world
. . . as soon as Cæsar.
Act 1, Scene 2.
(Cæsar) He reads much
. . . they are very dangerous.'
Parse :—
That you do love me I am nothing jealous.
Would he were fatter.
Let Cæsar seat him sure.

OCTOBER EXAMINATION, 1896.

MAY—8TH MONTH.

WORK TO BE PREPARED AND QUESTIONS THEREON.

A.—*English.*

First Year.—'THE BARD.'

1. Prepare lines 1–48. Be prepared to analyse any part and parse any word.
Learn all notes and references.
Learn the derivations of all important words.
Notes.—*Seize* (line 1) is Imperative Mood. *Wait* in line 2 is the same.
To save thy secret soul, etc., is an extension of the Predicate *shall avail.*
Line 9.—*Such* = Adjective, qual. *sounds* predicatively.
,, 14.—'To arms' forms the object of 'cried.'
,, 19.—Understand was. His beard was loose.
'*like*,' Adverbial Conjunction (like a meteor streams). *Meteor* = Nom. to *streams* understood.
,, 27.—*Vocal* = Adjective, qual. the Nouns *oak, cave, torrent.* In analysis this and the succeeding words form the enlargement of these Nouns.
,, 32.—In vain = vainly, Adverb of manner, mod. mourn.
,, 34.—*Bow* = to bow. The object of *made* = huge Plinlimmon to bow his cloud-topped head.
,, 36.—The whole line is an enlargement of *they* in line 35.
,, 37.—*Far*, Adverb mod. *aloof.*
,, 39–42.—Note the sentences here :—
1. 'Dear lost companions of my tuneful art,
Dear as the light, dear as the ruddy drops,
Ye died amidst your dying country's cries.'
(Principal.)
2. That visits these sad eyes = Adjective sub. to *light.*
3. That warm my heart = Adjective sub. to *drops.*
As in each case is an Averb. Conjunction.
,, 44–46.—I = Subject.
see = Predicate.
them sit = Object (sit = to sit, Verb in Infinitive Mood).
On yonder cliffs, a grisly band, avengers of their native land = enlargements of the Object.
band and *avengers* in apposition with *them.*

2. Analyse lines 1–8, 23–28, 39–42, 44–48. (It would be well to analyse the whole of the poem—if time can be found.)

3. Parse :—*King* (1), *wait* (2), *through* (3), *e'en* (6), *soul* (7), *that* (9), *aghast* (13), *robed* (17), *hark* (23), *each* (23), *breathe* (26), *no more* (27), *mountains* (32), *whose* (33), *head* (34), *ghastly* (36), *companions* (39), *do* (43), *band* (44).

Second Year.—'THE TRAVELLER.'

Prepare lines 1–50, with meanings, allusions, and the derivations of all important words. Be prepared to paraphrase and analyse any part and parse any word.
Notes :—
Line 1.—The Adjectives in this line refer to 'my heart,' line 8.
,, 7.—To see whatever realms = extension of reason to 'roam.'
,, 9.—Crown = Imperative Mood, 3rd person. So also *attend, be,* etc.
,, 14.—To pause = Infinitive of purpose.
,, 15.—Repair = Plural Number, agreeing with the two Nominatives *want* and *pain.*
,, 22.—Of = Preposition governing the Gerund *doing.*
doing = Gerund of the Regular Transitive Verb *to do,* governing good.
good = Abstract Noun, Objective case, governed by the Transitive Gerund *doing.*
,, 23.—We = Objective case, governed by *leads* in line 29. The whole sentence runs thus :—My fortune (Subj.) leads (Pred.) me to traverse realms alone, and to find no spot of all the world my own (Obj.); not destined to share such delights; impelled to pursue with unceasing steps; to pursue some fleeting good (Enl. of Obj.).

Line 24.—A nominative absolute phrase.
,, 25.—To pursue = Infinitive Mood, depending upon *impelled*.
,, 27.—Like = Adverb. Conj. That allures, like, the circle, etc., allures.
,, 31.—E'en = Adverb of emphasis, mod. *now*.
,, 32.—me = Reflexive object.
To spend = Infinitive of purpose.
,, 33.—on high = Adverb. phrase of place, mod. *placed*.
,, 35.—The Nouns in this and the succeeding line are in opposition with realms.
,, 40.—Vain = Adjective, qualifying *bosom*. Such construction is common after Verbs of *making*, *causing*, *creating*, etc.
,, 50.—Creation's heir = A nominative absolute, or in opposition with *me* in *mine*.

Questions:—

1. Paraphrase the whole of lines 1–50. (Space forbids a full paraphrase here, but I shall be pleased to criticise any specimens sent in.)
2. Analyse (*a*) lines 1–10, (*b*) 11–22, (*c*) 23–36, (*d*) 37–50.
3. Parse—
'Let school-taught pride dissemble all it can.'
'Allures from far, yet as I follow flies.'

Third Year.—POPE'S 'ESSAY ON MAN.'

Prepare lines 1–60, with all meanings, allusions, and derivations of chief words. Study the following :—

The preparation of this poem will probably prove a somewhat difficult task to young students. To barely understand it, still less fully appreciate it, requires a considerable amount of reading of the contemporaneous poets and writers, and a nice examination of the prevailing method of thought at that period. Notes and explanations alone will never supply the scholarship and critical acumen required to discuss and decide upon the theories of this didatic poem. The book from which most assistance may be procured is Pope's 'Essay on Man,' by Mark Pattison (*Clarendon Press*).

With these preliminary words of warning, we will proceed to explain as simply as possible (1) the origin of the poem, (2) the object with which it was written, and (3) the style.

1. The age in which Pope lived is often called by writers of the time the Augustan Age of English literature, from the belief that letters and writings had then attained their highest excellence ; but looking back upon it from our own time, we are not so ready to concur in the opinion. To us the writings of the school of which Pope was the chief exponent seem lacking in fire and beauty. The language is prosaic and matter-of-fact, and seems to lack entirely the strength and vigour of the Elizabethan age. The fact is that the result of the Revolution of 1688 had a depressing effect upon poetry. It was called upon to take part in politics, and being produced under pressure, as it were, lost the genuine ring of spontaneous writing. There are very few of the poems of the period which attract others than students, while the healthy vigour of Shakespeare and the Dramatists, or the careless ease of the Lyricists, renders the works of the 16th and early part of the 17th century interesting and attractive to all.

Of all the questions which were discussed at this age none was more common than the question of man in relation to the Deity. Many systems of theology were put forward which need not be here mentioned, and from their diametrically opposite views tended to make 'confusion worse confounded.'

Pope's great friend and patron, Lord Bolingbroke, undoubtedly supplied the idea to him that such a poem might be written ; indeed, some writers have gone so far as to say that Bolingbroke wrote the whole in prose, and Pope merely versified it ; but this is going further than is probable.

2. Pope was to a certain extent thus forced into writing on a subject to which his genius did not naturally impel him. A man's best work is that which he selects for himself, and he naturally selects what influences him most and deepest. A production on a *given* subject can never be so good as one which comes of itself. Again, Pope endeavoured to produce a system of theology by selecting what seemed best from several others. The result is, what might naturally be expected, a mixture of ideas and thoughts which is no system at all. He himself boasted that he had 'tempered one by the others and steered between extremes'; but the fact is, that not understanding his subject fully and deeply, he has mixed together incompatible ideas. The object of the whole work is expressed in the 16th line, Ep. I., 'To vindicate the ways of God to man.'

3. The style of the work is exactly what might be expected of a man who had endeavoured to piece together different systems of thought. There is no clear arrangement of ideas, no continued sequence of thought, no definite and dogmatic teaching, and this renders the work difficult of study. But we must remember that Pope was a great poet, and so we find the boldest arguments and greatest pathos mingled with exquisite figures and poetical imagery.

The metre is the common one of the time—the Iambic Pentameter in rhyming couplets. The versification is always good, even Johnson admitting that a thousand years might pass without producing such a versifier as he was.

Lines 1–16.—These lines set out the object of the poem, and may be freely rendered thus :—Come, my friend, let us leave the consideration of earthly affairs, which ambitious persons or those in responsible positions give such attention to, and, since life is brief, let us together ponder over the position of man in this world. It is a mighty maze, but it is not without a well-defined plan if one is carefully sought. The human world may be compared to a wilderness, where both flowers and weeds grow together ; or to a garden with all kinds of fruit—some good, some bad. Let us explore life in all its relations, study the laws of Nature, laugh at the folly of human manners and fashions; but let our chief object be to prove to man that the ways of God are always right and just.

,, 17–50.—In discussing man's station and God's dealings with him, we can only reason from what we see and know, and though we may examine the human race completely, we can only estimate the power of God partly ; we see only this particular planet. God surveys the whole solar system, and not only that, but the whole universe, containing countless systems of worlds, each of which may be inhabited by a race of beings suited to it by God's infinite wisdom. Since our minds are illimitably small as compared with the omniscience of the Deity, we must confess that we are not so well situated to judge of the moral, mental, and physical suitabilities of man.

The main line of thought is here introduced, and should be carefully thought out. Man is not an imperfect being, but a perfect being for the state in which he is placed and the work he has to do. He cannot grumble because he is not more intellectual, of higher morality, or stronger physical constitution, any more than a coral insect could. From the lowest form of life to the highest (that is God) there is a perfect gradation, and somewhere in that scale there must be such a being as man. He is not to grumble at being no higher, but to be thankful that he is no lower.

,, 50–60.—We are very often apt to say that, with regard to man's actions and positions, they are wrong ; but although they appear so from our point of view, they must be a part of some great divine scheme, into which they fit with perfect appropriateness. Man's work may be purposeless and useless, but God's cannot be so. Our erroneous judgments arise from the fact that we can only see a very small part of God's purpose, and, therefore, are not in a position to form a correct judgment.

Questions:—

Paraphrase and analyse lines 23–32, 43–50, 50–60.
Parse line 3, line 18, line 34, lines 51, 52.
(*Students are requested to send to address below any lines which present difficulties.*)

B.—*Arithmetic.*

First Year.

Boys.—Lock, Chap. V. Read carefully the Theory of Decimals, and work Example LXVII.

Girls.—Dixon and Beach. Read Chap. XXXVI., and work Example XXXVI.

Second Year.

Boys.—Lock. Work Examples CXXII. and CXXIII.

Girls.—Dixon and Beach. Read Chap. XXVII., and work Examples thereon.

Third Year.

Boys.—Lock. Read Chap. XVIII., and work all Examples.

Girls.—Dixon and Beach. Example XXXI. B, Nos. 1–36.

(Pay great attention to *method* and *arrangement.*)

C.—*Music.*

Continue working answers, and pay attention to the practical part.

D.—*Spelling.*

Learn 200 words from 'Words Commonly Misspelt,' or any good list. Test frequently by Dictation.

E.—*Geography.*

Siberia, W. Turkistan, Afghanistan, Asia Minor, Arabia, and Persia.

Notes.

Siberia.—Notice the climate of extremes. Short hot summers, long cold winters. The mineral wealth is very great. Exports:—Furs, hides, skins, tallow, metal, flax, etc. Imports:—Manufactured goods and colonial produce.

Towns: Tobolsk, Omsk, Tomsk, Yeniseisk, Irkutsk, Nertchinsk, and Vladivostock.

In the S.W. part.—Merv, Samarcand, Kokand, and Tashkend.

Note the Trans-Caucasian Railway to Samarcan and the advance made by Russia in recent years.

Western Turkestan.

Bokhara (70,000), capital of the state, under an Amir. A vassal state of Russia in 1868. The country produces corn and fruit, cotton, silk, wine, tobacco, and hemp. Sheep, horses, goats and camels numerous; gold, salt, alum, sulphur and coal.

Khiva (6,000).— a Russian vassal state; ruler, the Khan of Khiva.

Afghanistan.—A 'buffer' state between India and Russia. Ruler, despotic—Ameer. Rugged and mountainous. Severe climate. Inhabited by semi-independent tribes. Agriculture chief occupation. Mineral wealth great but unworked. Traffic by caravan. The present Ameer—Abdur Khan—has organised an army of 60,000 and started factories for manufacture of guns, rifles and cartridges, wine, soap, paper, boots, etc.

Towns: Cabul, Kandahar, Herat, and Balkh.

Asia Minor and Arabia.—Part of Turkish Dominions, divided into Pashaliks, each governed by a Pasha. Note recent Armenian disturbances.

Towns: Smyrna (figs), Trebizond, Bagdad, Damascus, Jerusalem, Aleppo, Erzeroum, Diarbekir, Mecca, Medina, Mocha, etc.

The South-Eastern part of Arabia is governed by the Sultan of Muscat (Oman).

The Kooria Mooria Islands, valuable for guano, belong to England.

Persia.—Called by the natives Iran. Absolute ruler the Shah (Nasir-ed-Din).

Wheat, barley, sugar, rice, opium, and tobacco; salt, iron, coal, copper, lead, etc. Turquoise and precious stones.

Manufactures: Silks, brocade, embroidery, arms, carpets, shawls, etc.

Chief Towns: Teheran, Tabriz, Ispahan, Meshed.

Draw maps of each country, insert all names to be remembered, and go over them till thoroughly known.

F.—*History.*

Charles I. (1625–1649).

Charles, like his father, believed implicitly in the 'Divine Right' of kings to do as they liked. The insistance of this led to disputes between king and parliament, which terminated in the Civil War. This period is of great importance, and must be carefully studied, especially the points at issue between the contending parties.

The following should be carefully studied and committed to memory:—

1625.—*First Parliament* (June to Aug.)
- (*a*) Two subsidies (£140,000) voted as supply.
- (*b*) Tunnage and Poundage granted for *one* year (instead of life).

1626.—*Second Parliament.*
- (*a*) Articles of accusation presented against Buckingham.
- (*b*) Parliament dismissed.

1627.—Buckingham's disastrous Expedition to the Isle de Rhé.

1628.—*Third Parliament.*
- (*a*) *Petition of Right* against tallage, forced loans, Benevolences, arbitrary imprisonment, and billetting of soldiers.

The King after an attempt at evasion gave his formal consent.

(Buckingham assassinated at Portsmouth.)

Second Session.
- (*a*) Irritation of the Commons at continued illegal taxation.
- (*b*) Resolutions passed condemning the practice.
- (*c*) Dissolution.

1629–30.—Eleven years of absolute rule—no parliament called.

1. Money raised by the following means:—
   - (*a*) Fines for not receiving knighthood when qualified (freeholders of £40 a year and upwards.)
   - (*b*) Fines for encroachments on forest lands.
   - (*c*) Fines for not residing upon their estates (to gentry.)
   - (*d*) Fines for extending beyond limits (City of London, £100,000).
   - (*e*) Customs dues.
   - (*f*) Fines imposed by the Star Chamber.
   - (*g*) Selling patents of monopoly.
   - (*h*) Loans and benevolences.
   - (*i*) Ship money.

   This last requires a word or two of explanation. Levied in Anglo-Saxon and Norman times upon coast towns to provide a fleet for defence, it was now extended to inland counties. Hampden's objection was not because it was unfair for inland places to subscribe to a fund for a navy, but because the *tax was illegally levied.*

2. *Ireland* under the able administration of Wentworth became quiet and fairly prosperous. Finance improved, justice administered, piracy checked, trade and manufactures developed, and a reliable army formed.

3. *Scotland.*

1637—Acting under the advice of Laud, Charles attempted to force upon the Scotch Presbyterians a new Liturgy based on the English Prayer Book.

1638—Great opposition. Formation of Scotch covenant to resist.

1639—Advance of Scots under Leslie. Charles with a small pressed army had to agree to the *Pacification of Berwick*—all matters to be referred to Parliament.

1640—*The Short Parliament* (April to May.)
- (*a*) Supply postponed till grievances had been discussed.
- (*b*) Proposed petition against the Scotch War.
- (*c*) Dissolution.

Advance of Scots to Newcastle. Treaty of Ripon.

1640—*The Long Parliament* (not formally dissolved till 1660.)

1641—Bill for Triennial Parliaments.
Ship money declared illegal.
Trial of Strafford, and execution.
Courts of Starchamber and High Commission abolished.
The Great Councils of Wales, the North, Lancashire and Cheshire declared illegal.
The Grand Remonstrance detailing abuses of the king's rule.

1642—Attempted arrest of the five members.
Demand of the Commons for the right to appoint officers of militia.
Bishops Exclusion Bill passed.
Command of the Fleet secured by the Commons.
Refusal of the Militia Bill by the king. Both sides prepared for war.
The 'Nineteen Proposals.'
Royal Standard raised at Nottingham.
Commencement of war.

G.—*Euclid.*

Second Year.—Book I. Revise Definitions, Axioms and Postulates, and Props. 1–6. Work 4 deductions per week.

Third Year.—Book I. Props. 13–24 and with 4 deductions per week.

H.—*Algebra.*

Third Year.— Scholarship Algebra. Read Chap. XX. and work examples thereon.

I.—*Teaching.*

Second Year.—Finish the teaching of Arithmetic. Note particularly the place and uses of Mental Arithmetic.

Test Questions.

1. *Penmanship.*—Write as specimens of—
   Largehand:—Xylophodon, Zoroaster.
   Smallhand:—A mist was driving down the British Channel.
   (Take great care with this subject.)

2. Write an essay each week, selecting from :—
   A winter's evening; 'A stitch in time saves nine'; A visit to a factory; Good humour; Angling; The choice of a friend.

3. *Notes of Lesson.*—(*First Year*)—Outline, 2nd and 3rd, Full notes.
   (1) The Hedgehog, (2) Teeth, (3) A Fish, (4) The Rainbow, (5) A Cottage Garden, (6) The Potato, (7) The Mariner's Compass, (8) Wordbuilding to Stand. IV., (9) A first lesson in Decimals, (10) Moods of Verbs.

4. *First Year.*
   Arithmetic.

   Boys. (1) Simplify $\dfrac{(2\frac{1}{2}-\frac{1}{3})\text{ of }(1\frac{1}{4}+\frac{1}{7})}{(\frac{3}{4}+\frac{1}{3})\text{ of }\frac{8}{9}\div\frac{2}{5}\div 1\frac{1}{12}}$. Ans. $3\frac{27}{128}$.

   (2) Compare the values of $\frac{1}{3}(2\frac{1}{2}-\frac{3}{8})$; $\frac{1}{3}$ of $(2\frac{1}{2}-\frac{3}{8})$; and $2\frac{1}{2}-(\frac{1}{3}\text{ of }\frac{3}{8})$. Ans. 19 ; 19 ; 69.

   (3) 3·05 of 1s. 8d. + 4·375 of £5 2s. 6d. + 7·08 of £1 17s. 6d. Ans. £35 19s. 4½d.

   (4) Explain, by reference to corresponding vulgar fractions, why ·307 = ·30700. In what other way can you explain this equality? Why is it wrong to read ·307 as 'decimal three hundred and seven?'
   Find the value of ·749 of 1 ton 1 cwt. 1 qr.
   Ans. 15 cwt. 3 qrs. 21 lbs.

   Girls. (1) 13 miles 7 fur. 11 yds. at £31 16s. 8d. per mile. Ans. £441 17s. 8⅓d.

   (2) Eggs are 2s. 11d. a score. How many for £7 13s. 1½d. Ans. 1050.

   (3) By how much is $\frac{1}{10}-\frac{1}{7}+\frac{3}{8}-\frac{1}{15}$ greater than $\frac{57}{240}$. Ans. $\frac{85}{336}$.

   (4) If a cwt. cost 19s. 10d., what is price of 5 tons 19 cwt. 72 lbs. Ans. £118 12s. 11d.

   (5) Make out the following account:—
   23 oxen at £18 13s. 4d. each.
   145 sheep at £38 10s. per score.
   96 pigs at 5½ guineas for six.
   45 fowls at 5s. 9d. a couple. Ans. £807 6s. 6½d.

   Music.—(1) Name the following intervals :—*ray–te* ; *fah–lah*; *me–doh*^{1} ; *soh–ray*^{1}; *te*$_1$*–lah.*

   (2) What is the mental effect of *ray, te, soh, lah?*

   (3) Rewrite the following, in 4-pulse measure, doubling value of every note and rest.

|	m	: s.	||	| f	: —	m ||
| r	:		||	| d	: —	||

5. *Second Year.*
   Arithmetic.

   Boys.—(1) A landlord allowed to his tenants a reduction of 15 per cent. on their rental. What was the rental of a man who paid £340. Ans. £400.

   (2) A man bought stock at 97⅝, and on its rising to 103⅜ he sold out, making a profit of £107 5s. How much stock did he buy (allow ½ brokerage)? Ans. £1,050.

   (3) A cistern full of water lost ·07 of its contents by leakage, and then 301 gallons were drawn off, leaving the cistern half full. How many gallons did it contain? Ans. 700 galls.

   (4) In how many years will £657 10s. produce £115 1s. 3d. as simple interest at 2½ per cent. per annum? Ans. 7 years.

   Girls.—(1) Reduce ⅝ of 2 tons 5 cwt. 3 qrs. to the fraction of ⅜ of 4⅘ of 3 tons 8 cwt. 14 lbs. 14 oz. Ans. $\frac{170}{2}\frac{28}{38}$.

   (2) One train travels 77½ miles in 1 hour 27 minutes, another 105½ miles in 2 hrs. 2 minutes, and a third 96½ miles in 1 hr. 55 minutes. Find the rate per hour in miles of each train.
   Ans. $53\frac{3}{29}$; $51\frac{3}{61}$; $50\frac{5}{37}$.

   (3) Find the L.C.M. of 132, 187, and 204, and the greatest common measure of 6167 and 9691. Ans. 2244 ; 881.

   (4) Simplify $\dfrac{7\frac{3}{47}+\frac{5}{5\frac{1}{8}}+3\frac{1}{3}\frac{3}{3}+\frac{13}{17}\text{ of }25\frac{1}{2}}{5\frac{3}{8}-\frac{1}{4}+6\frac{1}{2}}$ Ans. 1.

   Teaching.
   (1) What is the proper use of a ball frame in teaching arithmetic?

   (2) Write and analyse six capital letters, and explain how you would teach them.

   Music.
   (1) Rewrite the following passages without changing key :—

(*a*) s r m d ^{m}l$_1$ t$_1$ d r f t$_1$ m l$_1$ ^{r}l s m f r d
(*b*) m t$_1$ d ^{r}d f m r s f l$_1$ m ^{r}s t d^1 r^1 d^1

   (2) Name the following intervals :—*ray–fe, me–tu, doh–fe, fe–ray*^{1}, *ta*$_1$*–fah.*

   (3) Write over each note and rest its value in pulses or fractions of a pulse :—

| m. r, d	: s ., f	: m.	| s	:	—	: —. l	|
| t. d^1	: s, f. m	: r	| s, f. m, r : m		:	—	||

   Third Year.
   Arithmetic.

   Boys.—(1) In what ratio must two kinds of tea costing respectively 1s. 3d. and 2s. 2d. per lb. be mixed so that the mixture may cost 1s. 6d. per lb.? Ans. 8 : 3.

   (2) In a 200 yds. race A can give B 10 yds. start and just win, and can give C 20 yds. start; how much start could A give C?
   Ans. 29 yds.

   (3) A beam 18 feet long, and whose transverse section is a square contains 200 cubic feet of timber, what is its breadth?
   Ans. 3⅓ feet.

   (4) A company pays a dividend of 9 per cent., and its £10 shares sell for £25. What percentage will an investor get for his money? Ans. £3⅗.

   Girls.—(1.) A bicycle wheel is 3·625 yards in circumference and travels at the rate of 10·875 miles an hour. How many times will it revolve in a minute? Ans. 88.

   (2) A can do a piece of work in 8, B in 10, and C in 12 days. A, B, and C start on the work; B works 2, and C 3 days. In how many days after C has left will A finish? Ans. 1⅔.

   (3) If I pay £3·19375 for 3·0416 cwt. of sugar, how much is that for a pound? Ans. 2¼d.

   (4) The floor of a room is 21 feet 6 inches long and 15 feet 9 inches broad. Find the cost of carpeting—carpet 27 inches wide at 3s. 9d. a yard. Ans. £9 8s. 1½d.

   Teaching.
   (1) Explain the value of grammar as a means of mental exercise.

   (2) What are the chief points to be considered in criticising a lesson?

   Music.
   (1) Name the following intervals :—*doh-se, fah-se, se-doh*^{1}, and *se*$_1$*-fah.*

   (2) Which of the following is highest in pitch and which lowest?—*m* key E, *r* key B♭, *m*^{1} key D, *te* in key A♭, *ray*$_1$ in key A, *m*$_1$ in key F.

   (3) Explain the meanings of Staccato, M. 70, Three-pulse measure, Adagio, Dal Segno.

   Algebra.
   (1) Find the G.C.M. of

$$2x^4-x^3-2x^2+3x-1$$
$$2x^4-x^3+2x^2-3x+1$$
$$(2x-1)(x^3+x+1).$$

   Ans. $2x-1$.

(2) Prove $a^{4m} \div a^{m} = a^{3m}$.

Find the value of

$$\frac{x}{b-a} + \frac{x}{a} - \frac{a}{a+b} \text{ when } x = \frac{a^2(b-a)}{b(b+a)}.$$

Ans. 0.

(3) Solve

(*a*) $3x - [4 - \{5x - (2x - 1)\} - 6] = 9$. Ans. 1.

(*b*) $\frac{4}{10+x} + \frac{10}{6-5x} + \frac{6}{2-3x} = 0$. Ans. $\frac{32}{47}$.

6. *Geography.*

(*a*) Give an account of the chief plains and plateaux of Asia.

(*b*) What are the chief vegetable productions of Asia?

(*c*) Write a description of three islands connected with Asia.

7. *History.*

(*a*) Draw a genealogical table illustrating the descent of James I. and Arabella Stuart from Henry VII.

(*b*) What do you understand by the Plantation of Ulster? What led to it, and what were its results?

(*c*) Give some account of the beliefs held by the Stuart kings.

SCHOLARSHIP COURSE.

FIFTH MONTH—MAY.

1. *Reading and Penmanship.*—Ten minutes' practice each per day.

2. *Spelling.*—Learn 50 words per week from 'Words Commonly Misspelt,' or any good list. Practise dictation regularly, selecting passages from good standard writers.

3. *Composition.*—This subject needs great care and continual attention. It now receives as many marks as an advanced science. It must be considered a subject for special study, and not left to chance.

Write essays on the following subjects :—

(*a*) British affairs in South Africa.
(*b*) Japan and the Japanese.
(*c*) 'Whatever is, is right.'
(*d*) The works of Tennyson.
(*e*) Our national systems of education.
(*f*) Any recent scientific discovery.
(An essay should occasionally be sent in for criticism.)

4. *English.*

(*a*) Learn 50 roots and meanings per week.

(*b*) The Adverb. Prepare a good classification by function and by meaning. Comparison of Adverbs.

Points to Notice :—

Adverbs not only limit words but phrases and sentences.

Yes and *No* are not adverbs, but 'Word Sentences.'

Double negatives in modern English make an affirmative.

(*c*) *Literature.*—Chap. VI., Meiklejohn's 'Outline of English Literature.' Defoe, Swift, Addison, Steele, Pope, Thompson, Gray, Collins.

5. *Arithmetic.*

Boys.—Lock, Exs. CXXXVI., CXXXVII. and CXXXVIII. Stocks and Square Root.

Girls.—Dixon & Beach. Read Chaps. XXXII. and XXXIII.—Discount, Present Worth, and Percentages.

Be careful to work in clear and neat style. Explain methods of solution.

6. *Algebra.*

Boys.—'Scholarship Algebra.' Read Chaps. XXIII. and XXIV., and work all examples (Simultaneous Equations).

Girls.—'Scholarship Algebra.' Study Chap. VII., and work examples thereon.

7. *Euclid.*—Book II., Props. 13 and 14, and four deductions per week.

8. *Geography.*—AUSTRALIA.—(*continued.*)

QUEENSLAND.

Area, 668,497 sq. miles. Population, 450,000.

Productions.—Wheat, oats, barley, maize, coffee, sugar, cotton, oranges, peaches, pineapples, etc.

Exports.—Wool, gold, silver, lead, tin, pearl and tortoiseshell, meat, fruit, oysters, bêche-de-mer, sugar, timber, hides, skins, coal, tallow, livestock.

Half a million horses, 7 million cattle, 20 million sheep, 90,000 pigs.

Chief Towns.—Brisbane, Rockhampton, Maryborough, Townsville, Port Douglas, Ipswich, Gympie, and Bundaberg.

Government.—Separate colony, 1759.

Governor (Lord Lamington) and Legislative Council (41), Assembly (72).

SOUTH AUSTRALIA (a misnomer—a better term suggested—Centralia).

Area, 903,690 sq. miles. Population, 352,797.

Productions:—

Wheat, oats, potatoes, hops, and fruits of all kinds.

Copper, iron, silver, lead, wool.

(200,000 horses, 700,000 cattle, 7½ million sheep).

Note the copper mines of Moonta, Wallaroo, and Burra.

Towns.—Adelaide, Port Adelaide, Gawler, Kapunda, Kooringa, Palmerston.

Government:—

Governor (Sir Thomas Buxton) and Executive Council of 6.

Legislative Council.

House of Assembly.

WEST AUSTRALIA.

Area, 975,000 sq. miles. Population, 89,550.

Productions.—Mainly the same as other colonies in Australia.

The gold mines of Yilyarn and Coolgardie are being rapidly developed.

Exports.—Wool, timber (jarrah and karri), sandalwood, pearls and pearlshells, gold, guano, tin-ore, and skins.

Towns.—Perth, Fremantle, Albany, Geraldton, Coolgardie, York, etc.

Government :—

Governor (Sir Gerard Smith).

Legislative Council.

Legislative Assembly.

TASMANIA.

Area, 26,215 sq. miles. Population, 160,000.

Productions.—Timber, wool, gold, silver, copper, tin, fruit, and wheat.

Towns.—Hobart, Launceston, Waratah, Ringarooma, etc.

Government :—

Governor (Viscount Gormanston) and Council.

Legislative Council.

House of Assembly.

(Prepare maps of each. The necessity of preparing the geography thoroughly and exhaustively cannot be too much insisted on.)

9. *History.*—Henry V., Henry VI., Edward IV., Edward V., and Richard III.

Henry V.—Chief points :—

The Lollards. Continued persecution, execution of Oldcastle in 1417.

The Renewal of French War.

Henry revived Edward's absurd claim. The nobles were tired of peace, the merchants wanted new markets, and the rate of pay of common men-at-arms was three times that of a labourer, so the war was very popular.

Henry landed and besieged Harfleur, but after his army was thinned by sickness he endeavoured to make for Calais, crossed the Somme, beat the French at Agincourt (which must be carefully read up). In 1420 Henry again crossed the Channel, and after ravaging Normandy the Treaty of Troyes was signed, which provided that Henry should marry Catherine and become king on the death of Charles.

His early death of dysentery prevented this. His widow widow married Owen Tudor, from whom was descended Henry VII.

Henry VI.—

Minority.

Bedford, Protector of the Realm and Regent of France.

Gloucester, Regent in England in Bedford's absence.

War in France.

The Dauphin never agreed to the Treaty of Troyes, and as Charles died shortly after Henry V., he at once became King of what part of France he could, and commenced hostilities. The English were assisted largely by the Duke of Burgundy.

1423.—Battle of Crevant.
1424.—Battle of Verneuil.
1428.—Battle of Herrings.
} In all of which the English were successful.

Siege of Orleans, raised by Joan of Arc, from which time the English power rapidly declined. After conducting Charles to Rheims she was, in 1431, taken and burnt by the English.

A quarrel with the Duke of Burgundy and the death of Bedford further weakened the English cause, and notwithstanding the heroic attempts of Talbot in 1453 nothing remained but Calais.

Jack Cade's Rebellion.—Social and political discontent.

Home Affairs.

This was a period of aristocratic factions and generally weak rule. Gloucester, the popular leader, was opposed to Beaufort, Bishop of Winchester, the head of the Court party.

1442.—Henry came of age, and ruled with the advice of Beaufort, whose influence superseded Gloucester's. The latter died in 1447, and shortly after Beaufort followed him. Suffolk, who had risen into importance after the King's marriage with Margaret of Anjou, was held responsible for the loss of the French provinces, was banished and murdered at sea. The rival leaders then were Richard, Duke of York, and Somerset. In 1453 Henry went mad, and York was appointed Protector, and Somerset was imprisoned. The next year the King recovered, York was dismissed, and Somerset released. The Duke of York then raised an army and marched on London, and the Wars of the Roses commenced.

Wars of the Roses.

Causes :—

1. The jealousy of the great barons, and the indecent scramble for power.

2. The weak rule of Henry VI.

3. The antipathy to Margaret of Anjou.

4. The existence of a powerful leader—Richard, Duke of York, who thought he had a better right to the throne than the King himself.

The Yorkshire Claim :

A genealogical table, showing the descent of the Yorkist and Lancastrian families, must be prepared and carefully learnt.

Briefly : Richard, Duke of York, was, through his father, descended from Edmund, fifth son of Edward II. ; through his mother, from Lionel, Duke of Clarence, third son of Edward III. ; while Henry VI. was descended from John of Gaunt, fourth son of Edward III. The Duke of York was thus, on one side, of an older branch than the King. He was also allied, by marriage, with the Nevilles, who were most powerful.

Battles :—

1455. St. Alban's. Yorkists victorious.
1459. Bloreheath. ,, ,,
1460. Northampton. ,, ,,
1460. Wakefield. Lancastrians victorious. Duke of York killed.
1461. Mortimer's Cross. Yorkists victorious.
1461. St. Alban's. Lancastrians victorious.
1461. Towton. Yorkists victorious.
1464. Hedgeley Moor and Hexham. Yorkists victorious.
1471. Barnet. Yorkists victorious.
1471. Tewkesbury. Yorkists victorious.

Note the following :—

The Wars of the Roses, their character and results :—

It is a common mistake to suppose that the whole of the nation was involved in these sanguinary contests ; but this is not so. The war was carried on by the great barons and their armed retainers, and the general commons of the country pursued their usual avocations with less interruption, perhaps, than would have been received in time of peace. The results briefly were :—

(*a*) The final Extinction of the Feudal System. The loss of life among the barons and their retainers was enormous, and practically exterminated the powerful houses, which had kept up semi-regal state. One feature of the struggle, which is most terrible, is the ferocity with which both parties took revenge for the deaths of kinsfolk. This introduction of personal feud into a political contest accounts for the fierce contests and great loss of life. Those barons who still remained were so impoverished that they were glad to sell their estates and settle down as country gentry. Some even had to fly the country, and gained precarious livings by any menial work.

(*b*) The growth of commercial prosperity and enterprise. The great towns did well out of the contest, by obtaining concessions from both parties.

(*c*) The rise of a new nobility. Henry VII., on his accession, was able to rule quite absolutely. There were no great barons to hold him in check, and he took care that they did not regain their lost power. The new men were personal friends, who dared not oppose him.

This period is the closing scene of the 'Middle Ages,' or 'Dark Ages,' when brute strength was the only law of right. Henceforth a new era. Modern history starts, when intellect and mental ability were placed before rude strength and savagery.

Edward V. and Richard III., 1483–1485. Chief points :—

Richard's means of obtaining and securing the throne ; Buckingham's rebellion ; abolishment of Benevolences ; Earl of Richmond's invasion and Battle of Bosworth. Note that Richard III. was a most able ruler and soldier, and probably, had the throne come to him in a quiet and legitimate way, would have made a great king. He certainly was not the fiend portrayed by Shakespeare.

Learn the following note :—

Advances of the Constitution under the Lancastrians and Yorkists.—As the house of Lancaster reigned solely by the choice of the people and sanction of Parliament, they seldom, if ever, ventured openly to resist the powers of the Commons, who took advantage of the circumstances to make many advances, the chief of which were :—

1. They maintained and completely established their exclusive right of taxation.
2. They controlled public expenditure, voted their supplies for special purposes, and saw that they were properly spent.
3. They made supplies depend upon redress of grievances.
4. They controlled the king's household expenditure.
5. They established more fully the fact that laws can only be made by the consent of King, Lords, and Commons.
6. They began to give advice on matters of foreign policy.
7. They maintained the right to impeach bad ministers, to freedom of speech, and freedom from arrest.

10. *School Management.*

'Scholarship School Management, Chap. V. and VI. Spelling, Writing, Dictation and Composition. Test preparation by questions at the end of book.

11. *Domestic Economy.*

Washing: Materials employed, various processes.

12. *Music.*—Diatonic and Chromatic Intervals.

(Practical music must not be forgotten. A few minutes' practice each day is all that is required).

13. *French.*—Next five pages of 'Le Trésor.' Irregular verbs of the First Conjugation.

QUESTIONS TO BE ANSWERED.

1. *Penmanship.*—Write as specimens of—

(*a*) Largehand : Mellifluous, Nugatory, Ophthalmia, Pseudonym.

(*b*) Smallhand : There are no tricks in plain and simple faith.

2. Analyse the following passages and parse the words in talics :—

(*a*) Earth has *not anything to show more fair.*
Dull would he *be* of soul who could pass by
A sight *so* touching in its majesty ;
This city now *doth like* a garment wear

The beauty of the morning; silent, bare
Ships, towers, domes, theatres, and temples lie
Open unto the fields and to the sky,
All bright and *glittering* in the smokeless air.

(*b*) They parted ne'er *to meet* again,
But never *either* found another
To free the hollow heart *from paining*.
They stood aloof, the *scars* remaining
Like cliffs which had been rent asunder.
A dreary sea now flows between,
But neither heat, nor frost, nor thunder
Shall wholly do *away*, I *ween*,
The marks of that which *once* hath been.

(*c*) *There* is in souls a *sympathy* with sounds,
And *as* the mind is pitched the ear *is pleased*
With melting airs or martial, brisk or grave,
Some chord in unison with *what* we hear
Is touched within us, and the heart replies.
How soft the music of those village bells
Falling at intervals upon the ear
In cadence sweet! *now* dying *all* away,
Now pealing loud again, and *louder still*,
Clear and *sonorous* as the gale comes on.

3. In what manner does a relative pronoun resemble a conjunction? How would you distinguish one from the other?

4. Distinguish *Either* and *any*, *the other* and *another*, *Each* and *all*. What is peculiar in the following?

'Whoe'er she be,
That not impossible she.'

5. Write full notes of a lesson on the following:—
(*a*) Climbing Plants; (*b*) Fruits; (*c*) Hibernating Animals; (*d*) Feet of Birds; (*e*) Rainbow; (*f*) Hard and Soft Water; (*g*) Bricks; (*h*) Cotton Manufacture.

6. Why physical features have influenced the settlement of Australia. Give some account of the aborigines.

7. Say what you can about New South Wales under these heads: (*a*) Physical Features; (*b*) Productions; (*c*) Towns; (*d*) Government.

8. Trace the causes which led to the Peasants Revolt.

9. Give instances of important Statutes passed in the 14th century which tended to separate England from the Church of Rome.

10. Compare silk, linen, and wool as articles of clothing, and give instances of some harmful customs in modern dress.

11. Construct a modulator showing the first two removes sharp and flat.

12. On what principle are the chromatic notes of the scale named? What are the names for *doh* flat, *soh* flat, *me* sharp and *te* sharp?

CORRESPONDENCE.

1. Individual assistance will be given as far as possible by advice, solution of difficulties in any subjects, model answers, etc.

2. Specimens of Writing, Paraphrasing, Maps, Composition, etc., will be marked and criticised gratis.

3. To assist students in rural districts, Freehand or Model Drawings will be corrected and marked, with hints for improvement, etc., and returned if accompanied by a postage stamp.

4. As a rule, all replies will appear in the Correspondence Column, but anyone desiring an immediate reply may obtain it by enclosing a stamped, addressed envelope.

5. To ensure an answer in the next issue queries must be sent by the 15th of each month.

6. Name and address of sender, with coupon of current number of the PRACTICAL TEACHER, and *nom de plume* if desired, must be enclosed.

All communications and queries with regard to the PUPIL TEACHERS' AND SCHOLARSHIP COURSE should be addressed to 'A. T. FLUX, 12, Lower Park Road, Belvedere, Kent.'

ANSWERS TO CORRESPONDENTS.

NATURALIST.—I know of no novel which would suit your purpose. You can get a large amount of information on the United States from such magazines as 'Harper's' and 'Scribner's.' There are also many good geographical readers on the U.S. It is often possible to get much assistance from the pamphlets, etc., issued by the various shipping firms. The second part of your query I will answer by letter.

LULLAH.—Penmanship, 80 per cent. Downstrokes too thick and irregular. You will write extremely well with care; practise from a good model. Essay fairly good, 75 per cent. Sentences too short and detached. The ideas are not arranged in sections. Several slips in spelling. You confuse *affect* and *effect*.

GRAVESEND.—Essay, 80 per cent. Composition lacks vigour. The style is jerky. You evidently require considerable practice.

OXON.—Model very good—First Class. Freehand ditto. Essay good, 85 per cent. Your style is not fluent as it should be—the only remedy is practice. Map very good. Writing fair, lacks grace. Practise from a good model.

SCHOLARSHIP.—Writing a very good style, but lacking in finish, 75 per cent. Essay, 85 per cent. You consider stimulants and alcoholic drinks as the same thing. This is not so. Tea is a stimulant. Divide your essay into paragraphs and inset the commencement of each.

T. W. H.—Thank you for the suggestion, which I have adopted.

A. H. K.—The Test Questions will be returned fully marked for a fee of one shilling.

ANSWERED BY POST.—E. H. C. (Scaming); F.P. (St. Leonards); L.G.W. (Ripponden); M.G. (Bootle); C.S.G. (Leeston); W.P. (Leiston); E.F. (Hatherleigh); M.T. (Wrentham); G.H.G. (Devonport); E.B. (Rugeley); LAUREL (Hassocks); A.S. (Alvaston).

LONDON SCHOOL BOARD SCHOLARSHIP EXAMINATION.

IT has been announced that, in this month of May, considerably more than 500 scholarships will be competed for in London by boys and girls attending Elementary Schools. A large number of them are open only to children from Elementary Schools, others are not so limited. The source of about 300 scholarships is the fund placed at the disposal of the Technical Education Board of the County Council; while the remainder are provided by the City Companies and other special funds.

From the *Technical Education Gazette* we also learn that nearly 200 other scholarships are being offered for competition under similar conditions, by the County Councils of the counties immediately bordering on London. The preparation for the examinations at which the scholarships will be won has been going on in a large number of schools, and the competition probably forms a wholesome stimulus to the more advanced education of thousands of children. It thus appears that the offer of these scholarships is largely furthering the extension of certain stages of secondary and technical instruction; and, whatever may be the ultimate form of the new Education Bill, it is to be hoped that it will tend to increase rather than to diminish this sort of encouragement to the higher education of the brightest scholars in our Elementary Schools.

There are, undoubtedly, abundant difficulties in the way of this movement; but good judgment and professional skill enable the teachers of Elementary Schools to overcome them in most schools which are not handicapped by the extreme poverty and consequent negligence of parents in certain neighbourhoods. It requires, indeed, sound judgment as well as practical skill on the part of the teachers to select suitable children for candidates, and to arrange the best means of affording effective preparation. One desirable help is the practice of trial examinations, and it is to supply this form of assistance that we print the following sets of questions, which

were given at the close of last year to determine the award of scholarships offered by the School Board for London. As the requirements and conditions of the examination are very similar to those for the examinations of this month, we believe these questions will be found useful to teachers who desire to test the children they have been preparing. To make them further helpful, we add answers to the questions in Arithmetic and to the numerical examples in Mechanics.

It should be stated that two days were given to the preliminary examination, and two days, a week or two later, to the intermediate. Only two of the subjects set at the latter might be taken by any of those candidates who were called up to it. Two days more were occupied in conducting the final (*viva voce*) examination of those who distinguished themselves in the two previous trials. Prizes offered by the National Health Society were awarded on the results of the examination in Domestic Economy and the Laws of Health.

QUESTIONS SET AT THE PRELIMINARY EXAMINATION.

Arithmetic.

Time allowed—3 *hours.*

(*All the working must be shown.*)

1. Subtract 111,294 from the product of DCCXLIX (*Roman characters*) and three hundred and four thousand two hundred and six.

2. A man bought 2,000 yards at 3s. 7¼d. per yard, and sold it at a profit of 2¼d. a yard. Find the whole amount he received.

3. How many half guineas are there in £6,006?

4. Divide 2 tons 1 cwt. 3 qrs. 16 lbs. by 23.

5. A man's income this year is £741 2s. 6d., and his daily expenditure is a guinea and a half; he has also to pay an income-tax of 7d. in the £. How much will he have saved at the end of the year?

6. Two equal sums are divided, the one among 141 men and the other among a certain number of women; each man received 25s., and each woman 1s. 6d. less. How many women were there?

7. Simplify $\dfrac{2\frac{1}{2}+3\frac{1}{3}}{2\frac{1}{14}-1\frac{1}{5}} \div \dfrac{\frac{9}{7}-\frac{1}{2}}{1\frac{3}{7}+2\frac{5}{8}}$.

8. Simplify $\left\{7{\cdot}25 \times 1{\cdot}064 - \dfrac{8{\cdot}24}{51{\cdot}5}\right\} \times \dfrac{9{\cdot}25+3{\cdot}5}{9{\cdot}25-3{\cdot}5}$.

9. An English foot equals 30·4797 centimetres; how many feet are equal to 756 centimetres? (*Answer to* 4 *places of decimals.*)

10. A person is able to perform a journey of 142·2 miles in 4½ days, when they are 10·164 hours long; how many days will he be travelling 505·6 miles when the days are 8·4 hours long?

11. Find the value of—

2·86805 of 3s. + 8·3 of 4s. — 1·8 of 5s.

12. On what day will the simple interest on £432 19s. 8d., lent on May 8, 1893, at 3½ per cent. per annum, amount to £20?

13. A person sold a house for £832 10s., making a gain of 8½ per cent. At what price should he have sold it to gain £85? (*Answer to nearest farthing.*)

14. A man invests £3,790 in 4 per cent. stock at 112, and when it has risen to 113¾ he sells out and invests in 3 per cents. at 97. Find the alteration in his income. (*Answer to nearest farthing.*)

15. Two cogged wheels work together, there being 32 cogs on one and 36 on the other. The larger wheel makes 64 revolutions per second. How often will the same cogs come in contact during 6 working days of 8 hours each?

English History and Modern Geography.

Time allowed—3 *hours.*

1. Explain the terms:—*Thane, scutage, parliament, estates of the realm, benefit of clergy, high treason.*

2. Give, in order, the names of the Tudor and Stuart sovereigns, with dates of accession.

3. Give a brief account of *two* of the following:—(*a*) Constitutions of Clarendon; (*b*) Habeas Corpus Act; (*c*) The Act of Settlement; (*d*) The Statute of Mortmain.

4. Write down, in order, *six* of the most important events in the reign of (*a*) Edward III., and of (*b*) George III., with a few details about *one* event in each of these reigns.

5. Connect the following places with historical events:—Athelney, Hastings, Calais, Barnet, Whitehall, Sedgmoor, Blenheim, Corunna.

6. Write short notices (about five lines each) of *three* of the following:—Simon de Montfort, Wat Tyler, William Caxton, Thomas Cranmer, William Shakespeare, Horatio Lord Nelson.

7. Explain the terms:—*Peninsula, volcano, longitude, torrid zone, tropic of Cancer.*

8. Explain the cause of tides, and explain the occurrence of very high tides.

9. Mention *six* of the principal coal-fields of Great Britain, and state with what manufactures each is connected.

10. Describe the situation of the following places, and state what you know about each:—Leeds, Delhi, Quebec, Dundee, Hong Kong, Hobart Town, Cape Town, Yokohama, Melbourne, Washington, Dunedin, Colombo.

11. From what countries, respectively, do we chiefly obtain:—*Cotton, wool, silver, pearls, sponge, ostrich feathers, petroleum, opium, guano?*

12. Draw an outline map of Australia *or* North America, showing the chief physical features, and position of *eight* large towns.

English Grammar and Composition.

Time allowed—3 *hours.*

1. Parse fully the following sentence:—

'In April here, beneath the flowering thorn,
He heard the birds their morning carol sing.'

2. Analyse the following passages:—

(*a*) 'Then, leaping on his feet upright,
Some moody turns he took.'

(*b*) 'But if beneath yon southern sky
A plaided stranger roam,
Whose drooping crest and stifled sigh,
And sunken cheek and heavy eye,
Pine for his Highland home;
Then, warrior, then be thine to show
The care that soothes a wanderer's woe.'

3. What are conjunctive or relative adverbs, and why are they so called? Write two sentences containing one such adverb in each.

4. Explain how primary derivative verbs are formed from other words, and give three examples.

5. Underline the prefixes in the following words, and give their meaning:—*Outrun, withstand, ashore, exchange, forbid, postpone, introduce, prefigure, antipathy.*

6. Give the meanings of the following words, and write for each a short sentence containing it:—*Technical, function, schism, alloy, charter, vassals.*

7. Distinguish between:—*Advice* and *advise, vacation* and *vocation, ring* and *wring, site* and *cite, treatise* and *treaties.*

8. Paraphrase the following passage (using only simple words and phrases, so as to show clearly you understand the meaning):—

'Now sudden distant trumpets shrill,
In notes prolonged by wood and hill,
Were heard to echo far;
Each ready archer grasped his bow,
But by the flourish soon they know,
They breathed no point of war.
Yet cautious, as in foeman's land,
Lord Marmion's order speeds the band,
Some opener ground to gain;
And scarce a furlong had they rode,
When thinner trees, receding, showed
A little woodland plain.'

9. Correct the following sentences, giving your reasons:—

(*a*) Such a crowd won't come to day, I don't think.
(*b*) There is no doubt but that she will bitterly regret it.
(*c*) John's apple is not so large as mine, but James is the largest.

10. In the following passage supply the necessary capital letters, and put in the stops and inverted commas where necessary:—

where is your captain asked hirpinus he must needs have a large following is he here in rome can we see him ere we take the oaths and raise the standard comrades he added looking round this old man speaks as though he were in earnest nay he would scarcely dare to laugh in our very beards.

11. Write a short essay on *one* of the following subjects:—

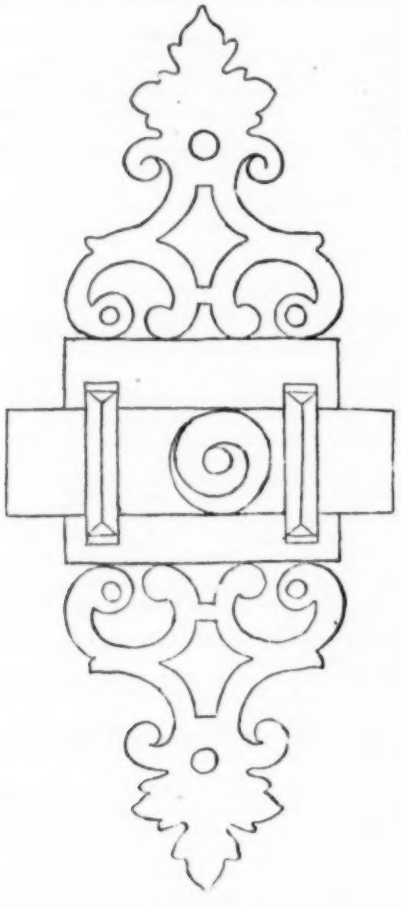
(*a*) Folly of indulging the passion of anger.
(*b*) The difference in the education of boys and girls.
(*c*) The most interesting book you have read.
(*d*) 'Oft from apparent ills our greatest blessings rise.'

Drawing (Boys).

Time allowed—2 hours.

Freehand.

Candidates are required to copy in pencil, carefully, the printed example, increasing the height about two inches, and the width in proportion. No ruling or measuring of any kind is allowed.



Geometrical.

(*The construction must in each case be fully shown*)

1. Draw a straight line 3½ inches long, and erect a perpendicular to it 2 inches long, at a point 2 inches from one end. Divide each right angle into four equal parts.
2. Construct a triangle, perimeter 5 inches, sides in the ratio of 5 : 4 : 3.
3. About an equilateral triangle, side 2 inches, describe a regular hexagon.

Needlework (Girls).

Directions.

1. Exercise A must be fully completed before Exercise B is begun, and no marks will be given for Exercise C unless Exercises A and B are both finished.
2. The pieces of calico marked A must be used for Exercise A.
The single piece marked B must be used for Exercise B.
The two pieces of print must be used for Exercise C.

Questions.

Exercise A.—Gather and stroke down 7 inches, and fix into a band of 3 inches, and set in 1½ inches.

Exercise B.—Double down as for a band the calico marked B, fix it by tacking, cut and work a button-hole, and sew on the button.

Exercise C.—Put on the smaller piece of print as a patch to the larger piece.

QUESTIONS SET AT THE INTERMEDIATE EXAMINATION.

Animal Physiology.

Time allowed—2 hours.

1. Give the distinguishing characters of the following groups of animals :—(1) *Mollusca ;* (2) *Vertebrata.*
2. What differences are observable in the structure of the teeth and of the stomach in vegetable feeding animals, as compared with those that live on flesh ?
3. Mention the different kinds of joints found in the human body, and explain their mechanical construction.
4. What is meant by perspiration, and what purpose does it serve ?
5. What is the difference between *arterial* and *venous* blood ? In what parts of the heart are they respectively found ?
6. Explain clearly the process of digestion.
7. What is the Pulse ? How is it produced ? Where is it felt ?
8. What is *Bile?* Name its chief ingredients, and state what are its uses.
9. What is meant by *reflex action?* Give an example.
10. Explain the terms :—*Tendon, capillaries, lymphatic vessel, pericardium.*

Elementary Science.

Time allowed—2 hours.

1. Define *heat* and *temperature.* How is a Fahrenheit thermometer graded ?
2. What is an aneroid barometer ? Explain its action and its uses.
3. A sportsman is shooting at a fish swimming in a pond. Show, by a diagram, in what direction he must aim, and explain the construction of the figure as fully as you can.
4. What is an *echo?* How is it produced ?
5. Explain exactly how you would find the specific gravity of (*a*) a piece of copper, (*b*) a piece of cork.
6. Describe any experiments intended to show that substances differ in their capacity for transmitting sound.
7. What is meant by *convection* of heat ? Describe some practical uses made of *convection.*
8. Sketch and explain the gold-leaf electroscope.
9. Explain why a fire-balloon ascends in the air, and why at some point it must stop rising.
10. Describe the construction and action of the air-pump.

Mechanics.

Time allowed—2 hours.

1. Velocity is said to be either uniform or *variable.* Explain these terms, and give one example of each.
2. What is meant by the *Resolution of Forces?* Mention cases in which it may be usefully applied.
3. Give an example of a body in stable equilibrium. How is the stability of a body resting on a horizontal plane affected by a change in the height of its centre of gravity, the form of the body remaining unaltered ?
4. A stone thrown upwards returns to the ground in 6 seconds. What was its greatest height ?
5. What is meant by the *mechanical advantage* of a system of pulleys ? Give an example.
6. A man weighing 150 lbs. carries a weight of 73 lbs. to a height of 25 feet ; how many foot-pounds of work has he done ?
7. A screw, whose pitch is ¼ inch, is turned by means of a lever 4 feet long ; find the power which will raise 15 cwt.
8. With a force of 3 ozs. acting parallel to the plane, what weight can be supported on a plane that rises 2 in 7 ?
9. Distinguish between *liquids* and *gases.* Describe some experiments to show that fluids transmit pressure equally in all directions.
10. At a depth of one mile below the surface of the sea, what is the pressure of water in pounds per square inch, a cubic foot of sea-water weighing 1,025 oz. ?

Euclid.

Time allowed—2 hours.

1. Define : *Circle, isosceles triangle, plane, superficies, parallelogram.*
2. Draw a straight line perpendicular to a given straight line of unlimited length from a given point without it.
3. If two triangles have two angles of the one equal to two angles of the other, each to each, and the sides adjacent to the equal angles equal, prove that the third angle of the one is equal to the third angle of the other.
4. Describe a parallelogram that shall be equal to a given triangle, and have one of its angles equal to a given rectilineal angle.

5. If a straight line is divided into any two parts, show that the rectangles contained by the whole and each of the parts are together equal to the square of the whole line.
6. Describe a square that shall be equal to a given rectilineal figure.
7. AOB is a triangle having the angle AOB double of the angle OAB. The angle AOB is bisected by a straight line, OC, meeting the base in the point C. Show that OC equals AC.
8. Show that the squares of the diagonals of a trapezium are together double the squares of the two lines joining the bisections of the opposite sides.

Chemistry.

Time allowed—2 hours.

1. Explain what you understand by *combustion*. Illustrate by reference to experiments.
2. What are the constituents of atmospheric air? How can you prove the presence of each?
3. What is sulphuric acid? What are its properties and uses?
4. What is a *chemical equation?* Give one example.
5. The well water at Canterbury is rendered 'soft' by the addition of a solution of lime. How is this effect produced?
6. How would you distinguish between oxygen and nitrous oxide?
7. What are the properties of nitrogen? Name some of the most important natural substances which contain it.
8. Mention some of the important properties of (*a*) animal charcoal, (*b*) vegetable charcoal.
9. What is borax? How is it prepared, and of what use is it?
10. Give (*a*) the law of multiple proportions, (*b*) the law of combining proportions; with one example of each.

Botany.

Time allowed—2 hours.

1. Why is the absence of light injurious to plants?
2. What is the use of a root? Under what circumstances may a plant exist without one?
3. What function does the leaf perform in the life of a plant?
4. From what plants, and from what parts of them, are the following obtained?—*Pepper, cocoa, gum, sugar, oil, sago.*
5. Describe the structure of the stem of a woody plant, and explain how it grows.
6. By what different methods do plants climb? Give two examples, explaining the process in each case.
7. Describe in botanical terms, as much as you can from memory, the structure of a Buttercup *or* Daisy.
8. Describe, with examples, the different kinds of Inflorescence, distinguishing between the definite and indefinite.
9. Give the characteristic features of the following orders:—*Cruciferæ, Umbelliferæ, Compositæ, Orchidaceæ.*
10. Show, by examples, the help which insects afford flowers, and name some plants which are fertilised by the wind, and others which fertilise themselves.

Domestic Economy and the Laws of Health.

Time allowed for Domestic Economy only—2 hours.
Time allowed for the whole paper—3 hours.

Domestic Economy.

1. What is *albumen?* Show its great importance as an article of food.
2. To what classes of food do the following respectively belong?—*Bread, salt, coffee, sugar, water.*
3. Why is dusty air unwholesome? Give directions for scouring boards, and for sweeping carpets.
4. Give some simple rules to be observed in bed-making.
5. Give recipes for making: (*a*) an Irish stew; (*b*) a suet pudding.
6. Explain the process of bread-making, with special reference to the action of yeast.
7. What are the respective advantages of candles, oil, and gas for lighting: (*a*) a bedroom, (*b*) a sitting-room?
8. What differences are there in the methods of washing woollen and cotton articles?
9. For what purposes are soda and blue used in washing? What articles should be mangled?
10. Describe, with sketches, two forms of window ventilation. Which do you consider the better, and why?

The Laws of Health.

11. Explain the action of soap in washing. Why is it not sufficient to use only cold water for keeping the body clean?
12. Of what use is a water-filter? Explain the construction and action of one that you have seen.
13. What evils result from making the waist unnaturally small, and from wearing tight boots?
14. In dwelling-houses the painted walls are sometimes covered with moisture. Account for this, and suggest some method of preventing it.
15. Why are exercise and good food necessary for health? What is your opinion of alcohol as a health-promoter?
16. Mention the principal diseases of children. Describe the symptoms of one of these diseases, and show how the child should be cared for while ill.

French.

Time allowed—2 hours.

I.—*Translate into English.*

1. Mon oncle a donné de l'argent aux pauvres.
2. Savez-vous quand mon père reviendra?
3. A quelle heure sont-elles parties?
4. Voici de bien jolie boutons; mon frère choisit celui-ci, et ma sœur celui-là.
5. Pardon, monsieur, ceci est à moi.
6. On a démoli beaucoup de maisons à Paris cette année.
7. Un homme qui avait été volé plusieurs fois dans les rues de Paris, n'osait plus sortir. On lui conseilla de prendre des pistolets. 'Les voleurs,' répondit-il, 'me les prendront aussi.'

II.—*Grammatical Questions.*

1. Give the English and the plural of: *L'oncle, le temps, la voix, tableaux, du joujou, le travail principal, il a été malade.*
2. Give the feminine of: *Petit, bon, juste, doux, attentif, nouveau, trompeur, mon, ce, celui.*
3. Distinguish between: *Vers* and *envers; dans* and *en; avant* and *devant.*
4. Explain how the ordinal numbers are formed; and write in French 17, 29, 178, 4th, 16th, 23rd.
5. Give the first person singular of the indicative future, and of the subjunctive present of: *Avoir, finir, recevoir, aller, dire, venir.*
6. Give some rules for the inflection of the past participle in French.

III.—*Translate into French.*

1. Where is your brother? He is in London now.
2. He is always at home after seven o'clock.
3. We shall be in Paris on January 22nd.
4. Do you know what we have bought?
5. We shall be very glad to see them, as we are quite alone here.
6. I shall not go to school, I have a bad headache.
7. You promised me a beautiful book, why did you not give it to me?

Latin.

Time allowed—2 hours.

I.—*Translate into English.*

1. Epistola a rege scribebatur.
2. Milites ducem suum vulneraverunt.
3. Frater Caii omnem pecuniam eius secum portabit.
4. Saepius de eadem re monebimini.
5. Ter illa loqui conabatur.
6. Caesar suas copias in proximum collem subducit.
7. Non dubitabat pater quin magistri pueros linguam Latinam docuissent.
8. Socrates accusatus est quod corrumperet iuventutem et novas superstitiones induceret.

II.—*Grammatical Questions.*

1. Decline in the singular: *Nobilis haec tribus;* and in the plural: *Ingens illud opus.*
2. Compare: *Pulcher, audax, magnus, bene, optime.*
3. Write in Latin, 11, 27, 39, 200 men, 16th, 49th.
4. Give the 3rd person singular of the indicative perfect of: *Sum, moneo, rego, amor, utor, vinco, volo, vincio.*
5. Explain the construction of the ablative absolute, and give two sentences in illustration.

III.—*Translate into Latin.*

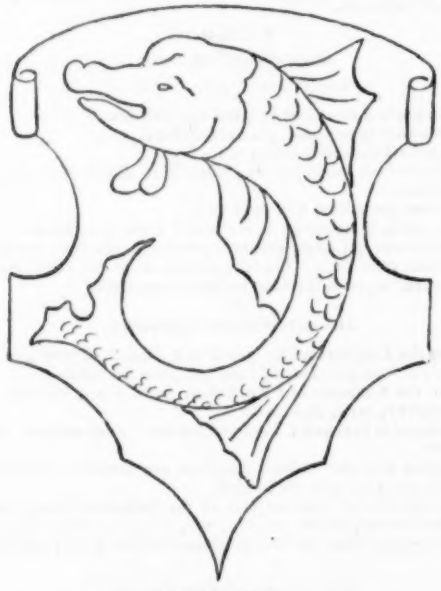
1. The slave loves the children.
2. Rewards were given to his sons.
3. The poet's father will give his books to my friends.
4. Which horse has the man?
5. It is the duty of a Christian to spare his enemies.
6. The boy knows that his father will soon come back.
7. There is no doubt that they drove the virtuous citizens from the city.
8. He denies that disgraceful things can be useful.

DRAWING.—(GIRLS.)

Time allowed—2 hours.

Freehand.

Candidates are required to copy in pencil carefully the printed example,* increasing the height about two inches, and the width in proportion. No ruling or measuring of any kind is allowed.



Geometrical.

(*The Constructions must in each case be fully shown.*)

1. From two points A and B, 3 inches apart, draw two straight lines to meet at right angles.

2. Bisect a straight line 3 inches long by a perpendicular. Trisect each of the four right angles thus formed.

3. Draw three straight lines crossing at angles of 60°. Describe six circles each to touch two lines at points one inch from the intersection.

4. Construct a regular polygon having one side 1½ inches and one angle 135°.

Answers to Questions in Arithmetic.

(1) 227,739,000.
(2) £379 3s. 4d.
(3) 11,440 half-guineas.
(4) 1 cwt. 3 qrs. 8 lbs.
(5) £144 12s. 8¼d.
(6) 150 women.
(7) $80\frac{81}{143}$.
(8) 16·750173 nearly.
(9) 24·8034 ft. nearly.
(10) 19·36 days.
(11) £1 12s. 9·6498d.
(12) September 2, 1894.
(13) £852 5s. 7½d.
(14) £16 16s. 7½d. less.
(15) 1,382,400 times.

Mechanics.

(4) 144 feet.
(6) 5575 foot-pounds.
(7) 1·392 lbs.
(8) 10½ ounces.
(10) 2348·958⅓ lbs.

NOTES AND NOTIONS.

BY T. B. ELLERY,

Ex-President of the National Union of Teachers.

The Brighton Conference. For many reasons the Brighton Conference will be remembered by hundreds of teachers as probably the 'best on record.' Naturally I turn with great affection and profound respect to Manchester, and to me, at any rate, the 1895 Conference must always be especially dear. But the majority of the representatives to London-on-sea, with no such tender memories, will, I have no doubt, assert that never in the history of the Union was there such a week. Was not the 'Agenda,' so carefully drawn up by the Executive, by unanimous vote of the Conference thrown over in order that the Education Bill might be discussed? And were not the debates on this Bill on a high level of excellence? Did we not have a popular President? Did not T.R.H. the Duke and Duchess of York honour us with their presence? And did they not accede to the request made to them to become Patron and Patroness of the Charitable Funds of the Union? Last, but not least, were not the local arrangements, in nearly every respect, of an admirable character?

The Pavilion, the Dome, etc., were placed at the disposal of the Union by the Mayor and his colleagues; the welcome by the authorities was most cordial; the dinner, the ball and soirée, and the 'At Home' by the Brighton Association were all highly successful; indeed, none but the most ungrateful would attempt to criticise the local workers and their efforts to give general satisfaction.

The President's Address. In part written after the introduction of the Education Bill, Mr. Macnamara's address was quite up to date, and I am confident it will be generally admitted it was a model of what a Presidential Address ought to be. One sympathised with him in having to place before the country his views upon what has been termed 'a far-reaching, drastic, and revolutionary measure,' before he had seen a line of the Bill in print. All he had to guide him was Sir John Gorst's speech in the House, and that same evening he sat down to collect his thoughts and commit to paper his opinions, his purpose being, as he told the Conference, to interpret what he conceived to be the strictly educational view of the probable effect of the proposed changes. Some of the Radical papers have denounced him for his moderation, and because, as an honest man, he accepted the proposals of the Government as a fair and reasonable attempt to improve the education of the country. The fact that Conference in its debates and resolutions left him 'high and dry' has been the cause of much rejoicing in certain quarters, but in the long run I venture to say the President will be commended for his honesty and his moderation.

One morning paper, better known for its football and cricket intelligence than for its 'politics,' in a tirade of abuse cast even good taste to the winds. Criticism such as this has no effect upon the President of the N.U.T., except, perhaps, that it convinces him—if, indeed, he wanted convincing—that he took quite the right line in his comments on the Education Bill. 'Personally,' said he, 'I think national education a matter of sufficient national concern to call for the election *ad hoc* of its controlling local authority.' But because he is prepared to compromise on the constitution of the authority for the sake of its function, and because he thought he saw a few good points in the Bill, he is a 'reactionary' and a 'traitor!'

Referring to other portions of the address, I am sure teachers generally will be grateful for Mr. Macnamara's denunciation of compulsory extraneous tasks, and his eloquent plea for (1) reasonable security of tenure for those engaged in the nation's schools, and (2) superannuation at the close of long and honourable service.

The Conference. 'The Bill, and nothing but the Bill,' was practically what the representatives asked for early in the week, and before their labours were over they had so altered its appearance that Sir John Gorst could not possibly recognise the offspring which he introduced with so much pride to the notice of hon. members of the House of Commons only a few days before. Says the *Daily News*: 'Not much of the Bill, on its Elementary Education side, is left after the riddling process applied by the teachers. The Ministerialists, who hoped great things for the Bill from the opening speech of the President of the Congress, will get up from reading his closing speech sadder and wiser men.'

In taking farewell of the Conference, Mr. Macnamara summarised the week's work. He told the representatives they had decided that:—

1. The educational authority should be elected *ad hoc*.

2. There should be no further devolution of powers to smaller local authorities, such as is proposed in Clause I. 6 (*a*).

* This example has been reduced to about three-fourths the dimensions of that actually given.

3. There should be no limit to the amount of grant which might be earned per child.

4. The special aid grant was absolutely inadequate, and that in any case it should be ear-marked, so as not to be diverted to the relief of voluntary subscriptions.

5. There should be no federation of schools.

6. The 17*s.* 6*d.* limit should not be abolished.

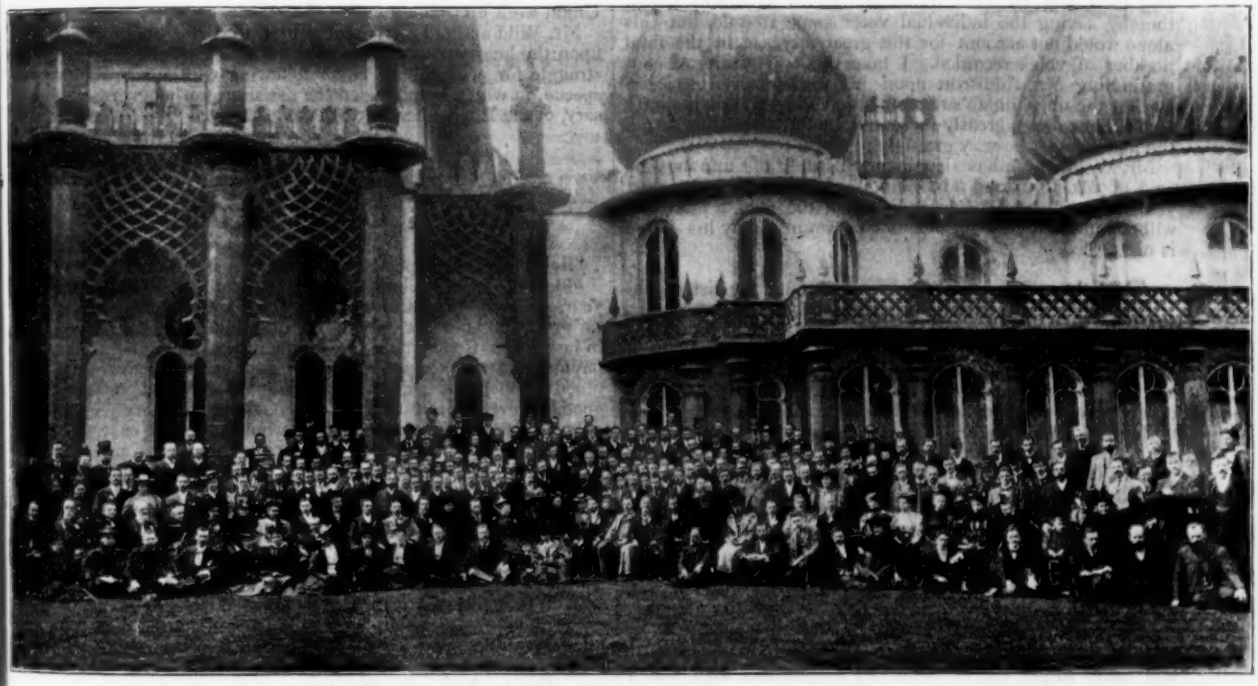
That being so, the Executive of the Union has a plain duty, whatever views individuals may hold. Personally, I cannot agree with all that Conference did, but I am quite sure that both 'platform' and 'floor'—or, at all events, the great majority—were actuated by a desire to remove abuses and to improve the conditions under which teachers work.

The Voluntary School Teachers and Conference. It is rumoured that, as a counter-blast to the action of Conference, the leaders of the Voluntary School Teachers' Association will organise a demonstration in London in support of the Government measure. (The Conference will have been held by the time this issue of the *Practical Téacher* is in the hands of my readers.) The usually well-informed London correspondent of the *Manchester Guardian* says: 'An offer from a mysterious source has been made to defray all the travelling and hotel expenses of as many Voluntary School teachers as can be persuaded to assemble for the purpose . . . The offer has been made to a Voluntary School teacher in London, who has made himself prominent by attacks upon the National Union of Teachers and its progressive policy. Probably an attempt will be made to form a union of Voluntary teachers in rivalry to the National Union of Teachers. Such a union would act, it is thought, as *claque* to the Government in their proposals on education.' I give this for what it is worth, assuming no responsibility whatever. But I can say that there is a project on foot to establish a weekly paper which shall voice the views of the Voluntary School teachers, and of this more will be heard shortly.

My only regret is that every Voluntary School teacher in the country does not come into the Union and make his voice heard.

If there is any injustice, if there is any neglect of the interests of a section, let us discuss the matter at the Executive Board and in Conference.

Deputations to the Conference. One of the features of the N.U.T. annual gathering is the reception of representatives from kindred associations both at home and abroad. On this occasion we were favoured with the presence of Mr. Dunlop, President of the Educational Institute of Scotland (wearing his robe and gold chain of office), and his colleague, Mr. McKim; M. Blondiau and M. Falleur from the Fédération Générale des Instituteurs Belges, and M. Kappenburg, M. Meijer, and M. Ketelaan from Holland. They have returned to their respective homes with lively recollections of Brighton, and of the cordial welcome they received. Nothing but good, I am convinced, can result from these interchanges of goodwill and sympathy. Long may they continue! There was at one time just the possibility of a visit to the Conference of a lady teacher from Helsingfors (Finland), but, unfortunately, the lady's engagements did not allow her to leave Paris, where she was taking part in a Women's Congress. A representative from the Swedish N.U.T. was also expected. Herr Salomon of Nääs was present at the Oxford Conference, and in the summer of 1895 we had the pleasure of welcoming Herr Lidholm of Stockholm, who was here on a mission of enquiry as to our schools and education generally.



A GROUP OF DELEGATES AT THE BRIGHTON CONFERENCE.

[Photo by T. Donovan, St. James Street, Brighton.

The Budget and Superannuation. Many teachers doubtless looked to the 17th April as the day on which the Chancellor of the Exchequer would set their minds at rest with respect to Superannuation. I confess that I, too, thought Sir Michael Hicks-Beach—especially after his letter to the Bristol teachers some months ago—might possibly announce that he was prepared to set aside the thirty or forty thousand pounds necessary to float the scheme, or that, failing any mention of the matter by the right hon. gentleman, someone in the House would ask why provision was not made in the Budget proposals. But, of course, such an announcement was not absolutely necessary. I have a 'balance in hand'

which will more than meet any demand in the way of Teachers' Superannuation. Moreover, as the promised Bill will not, I suppose, come into operation until January 1st, 1897, the first quarterly payments will not fall due until the close of the present financial year. I believe the prospects of a Bill being introduced this year are distinctly good, the absence of all mention in the Budget notwithstanding.

The New Vice-President. The result of the election for Vice-President has been, as everybody expected, the return of Mr. C. J. Addiscott, the genial and hard-working Chairman of the Law Committee. All the candidates were well-known men, Mr. Waddington having done good work as Vice-Chairman of the Education Committee, Mr. Clancy as Chairman of the Parliamentary and Parliamentary Election Committees, and Mr. Tom John for some time as Chairman of the Organisation Committee.

Nearly 21,000 members voted, a very encouraging sign, inasmuch as it betokens a growing interest in Union matters. I am aware that on this occasion, for the first time, the voting papers were collected at the local association meetings, and then sent by the various secretaries to headquarters, thereby saving the individual voter some trouble, but this alone would not account for the great increase in the total number of votes recorded. I take this opportunity of congratulating Mr. Addiscott upon his well-deserved success. But for the unfortunate superannuation incident, his majority would have been greatly increased, but, even as they stand, the figures must be very gratifying to him.

Mr. Waddington has also done well, and the same may be said of Mr. John and Mr. Clancy. I understand that next year there will be a new candidate in the field, a man who will command a very large following immediately his name is mentioned.

The New Executive. I am sorry to see among the list of unsuccessful candidates the name of Mr. John R. Langler, a former President, and a member of the Executive for many years. Of late, Mr. Langler has been unable to give as much time to the work as he used to give, and this probably accounts for his defeat. Mr. Baldwin, too, deserved a better fate, and so did Mr. Gill.

But every year there are surprises, and this year's results are no exception to the rule. The remarkable feature of the returns is the number of Devonshire men who hold office. The President, the Vice-President, and the Ex-President are all 'men of Devon'—a 'county record,' surely! And, in addition, several others from the land of junkets and cream are to be found on the Executive.

Royal Patronage for the Charities. T.R.H. the Duke and Duchess of York—as I ventured to prophesy in last month's 'Notes and Notions'—have reason to remember the N.U.T. purse-day as long as they live. They will never forget the extraordinary enthusiasm with which the teachers received them, nor will they forget the touching speech of Mrs. Burgwin, who voiced the Union's thanks for the honour of the royal visit. I have worked side by side with Mrs. Burgwin for many years, and have listened to many excellent speeches from her, but I think the intensely pathetic and touching remarks she made on this occasion stand out as probably her finest effort. One felt proud, as one heard her, that the Union possessed such a true-hearted, eloquent woman, one who, whatever the occasion, can always do credit to herself and to the profession of which she is so distinguished a member.

No one on the platform was more touched than the Duke himself, and I say this from personal observation. The cheering was most enthusiastic throughout the proceedings; but when H.R.H. rose to speak, it seemed as if all Brighton were present and joining in the welcome given to the Sailor Prince and his bride. That the royal visit has done much for the funds goes without saying. The announcement that the Duke and Duchess would accede to the request to become Patron and Patroness will do more to bring the charities under the notice of the public than anything else could possibly do, and I say, without fear of contradiction, there are no more deserving funds in this country.

Let me add, as I am anxious to give credit where credit is due, that the elaborate satin programmes used by the Duke and Duchess in the Dome were the gift of the proprietor of *Brighton Society*. I also desire to draw special attention to the Royal Visit number of the *Brighton Gazette*, a really excellent production in every way—paper, printing, and illustrations being of the best.

The Irish National Teachers' Congress. While we were busy at Brighton our Irish brethren were holding their 29th Annual Congress in the Queen's College, Belfast. My old friend, Mr. D. A. Simmons, was re-elected President (for the fifth time, I am told), all the other candidates for the office having retired in his favour. During the week resolutions dealing with 'The Proper Remuneration of Teachers,' 'Compulsory Education,' 'Reasonable Security of Service,' 'Payment of Assistant Teachers,' 'Teachers' Pensions,' 'The Irish Language,' were submitted.

At the Conference dinner the toast of the 'National Union of Teachers' was duly honoured, the responders being Mr. Robert Wild, B.A., and Mr. F. Peaker, both of whom were in Brighton on Easter Monday and Tuesday, doing Union work up to the moment they left.

Mr. Wild assured his Irish brethren that they might count upon the hearty co-operation of the English teachers in their struggle for justice, Mr. Peaker following with a capital little speech, in which he promised the assistance, whenever necessary, of the English teacher M.P.'s.

OUR SCOTCH LETTER.

'Not loud but deep.' The expected has come to pass in the matter of the Class Subjects in Scotland. Up till this year, a selection of, at most, three was allowed, with grants of 1*s.* or 2*s.* for 'fair' or 'good,' on examination. A provision in last year's Code made the number two, and grouped the payments, attempting to secure greater efficiency by a combined payment of 4*s.*, 5*s.* or 6*s.* for 'fair,' 'good' or 'very good.' Several protests were raised, under the very reasonable suspicion that most Inspectors would adopt the easy solution, and, in the majority of cases, salve their consciences by recommending the medium payment. This is exactly what has happened. Thus, in Glasgow, for example, *one* school has secured the highest grant. The remainder fall into the middle group, which means the loss of a shilling, as, under the previous conditions, they were all able to come out with three 'goods.'

'Gild refined gold.' Apart from the financial consideration, on which alone, it is to be regretted the Glasgow Board has appealed to the Department, the change has an educational aspect, which might easily have been worked up. The tendency of administration has, lately, been the abolition of minute sub-division in the assessment of grants, and the substitution of broad general principles to the maximum number of two. Even that platform has been, very generally, recognized as containing one too many, and the hope has been gaining ground of, sooner or later, seeing the 'single tax' adopted. In the event of further appeals, the position of the Department, in going straight in the teeth of its own recent policy, should be strictly insisted upon. Little hope exists of a successful crusade on the mere loss of grant. It would require 'a long spoon' to sup such fare with a Government Office.

The year's arrangements. With a highly-surcharged atmosphere, the issue of the Code was anxiously expected this year. So little change, however, is apparent that it may almost be looked upon as the proverbial 'calm before the storm.' In day-school matters the epidemic innovation is the only change of importance. Henceforth, Boards may obey, with a light heart, the mandate of the Local Sanitary Authorities, and shut their establishments without reduction of grant or the fear of the '400' minimum. The enactment is reasonable in view of the advance in modern times of the knowledge and experience of epidemic disease. The new

provision is sufficiently far-reaching to compensate for loss of money, through the exclusion of certain children under medical authority, even if the school, in the meantime, remain open. For evidence of 'sweet reasonableness,' this is a step in advance of the usual practice of Dover House, and, as such, is to be commended.

The insertion of the wedge. If the day be humdrum, the evening is certainly to face the music. Reference was lately made, in this column, to the short shrift, which certain proposals, with regard to the Evening Continuation School, received at the hands of the Glasgow Local Association. The presumably bold, and by common report, bad subcommittee have not had long time to wait for revenge. The Evening School Code makes sad innovation on the rural ease and liberty hitherto prevalent in this domain. Three limitations at one fell swoop bring the continuation almost into line with day-school conditions. The El-Dorado vanishes when you cannot teach more than forty scholars; a limitation of subjects destroys the 'circus' idea, lately so prevalent, and opens up a vista of work. Last, but by no means least, reduction of grant from a tenth to a half for faults of instruction, discipline or registration, contingent on visits of surprise, without the tangible results of individual examination, is, in itself, calculated to give new views of future possibilities.

Modern competition. The modern competitive system is invading even our educational corporations. A 'sough' has recently been in evidence as to the retiral of the secretary of the institute, but the fact has not, as yet, been officially intimated to the only body capable of formally re-receiving it, the General Committee of Management. That, however, seems to be no bar, in the present state of society, to the appearance of candidates and the commencement of a vigorous canvas. The circular is abroad in the land. It is, perhaps, a compliment to the growing importance of the institute, to find such eagerness manifested to undertake laborious duties, at what is likely to be for some time, nominal remuneration, but it can scarcely be grateful to the feelings of Dr. Smith, to find his resignation anticipated at such a furious pace. It might be well for delegates to refrain from premature pledges, as the formal intimation is likely to bring into the field candidates, whom decency and order forbid to take advantage of an advance intimation.

The 'passing' of the dominie. The publication of the Class List of the last Scholarship Examination shews the male teacher, as admitted by the regular door, still on the decrease. As has been the case for several years, if all the applicants had been found qualified, the total would have been under the requirement. But, alas, all have not qualified, and the net result is barely sufficient to supply half the natural waste on the male side. Of the whole, 172 have passed, but when 50 third class are deducted, 112 are left to fill the gaps two years' hence. The Training Colleges will, of course, fill up their official numbers with females, but that does not alter the problem to be faced in a few years, the effect on our education of the reversed proportion of the sexes. It is already bearing its fruit, in the economic region of the profession, and it can scarcely be anticipated what development may yet be experienced on this head, when, perforce, female labour must undertake that which has hitherto been entrusted to the other sex.

The new army. On the other hand, the ladies show no signs of numerical decay, 869 female candidates having passed the test. It is interesting to observe, however, that over 300 of them are placed third-class, and thus, while not considered worthy of being trained, are thrown on the labour market in the capacity of Ex-P.T.'s, with consequences which are daily becoming more and more felt. Thus the Government mill grinds from year to year. Money is expended to produce the finished article, while, without further expenditure on the part of anyone, the unfinished, nay, the publicly-branded as not worth finishing, is granted a status and an opportunity of competition, very little inferior to the superior product. Little wonder that Boards take kindly to the Ex-P. T. in Scotland. Outside of the few large centres of population the classes do not average 40 scholars. In present circumstances even a trained teacher is over-weighted with two classes of 30 each. The Ex-P. T. therefore fits the hole admirably.

The heather on fire. A circular has recently been issued to all the Secretaries of Local Associations, which is likely to mark a departure in the Scottish policy on Superannuation. Previously we were content to wait the fate of the 'predominant partner,' and to come sailing in in the wake of the greater interest. Recent events have proved too many for this very sensible spirit, and the claims of the North bid fair to be strongly urged, on their own merits, at once. As the circular states, 'the placing of another educational interest in front of Superannuation has seriously endangered the prospects of immediate solution so far as England is concerned,' and the Local Authorities are exhorted to be up and doing on their own account. The policy has caught on, and already M.P.'s have been approached, and, in some instances, personally interviewed. With the greater din about to be evolved on the Voluntary question, there was much danger of shelving what now must appear to the country the minor matter. The 'waking up' of the Scottish member will, at least, prevent that undesirable consummation.

Pallida Mors. During the month a past-master in the art of teaching, in the person of John White, LL.D., passed to his earned rest. In one particular, mathematical tuition, Dr. White's name has long been a household word north of the Tweed. No teacher, probably, has had through his hands a more distinguished succession of students than the late mathematician of Irvine, some of whom almost emulated the fame of their instructor. Although for a considerable time prior to his death he lived in complete retirement, the removal of the Doctor is a distinct professional loss.

SCIENCE NOTES.

OXALIC ACID AS A COLOUR PRESERVATIVE.—Some time since Niewhaus suggested that the fading of plant colours resulted from the presence of ammonia in the air, and he therefore recommended plants to be dried between folds of filter paper impregnated with a one per cent. solution of oxalic acid. J. H. Schroeder now finds that the use of drying paper prepared with a stronger solution of the acid will preserve the colour of leaves. Leaves of a thin texture are well preserved with a two per cent. solution, but thicker specimens are best preserved with a three per cent. solution. The leaves of aquatic plants also require the use of a two or three per cent. solution. It is advisable to thoroughly saturate heavy grey felt paper with a three per cent. solution of oxalic acid and then dry it. The plants should be placed directly between the sheets of prepared paper, only very delicate petals being protected by pieces of thin paper. The drying paper should be changed once in every twenty-four or every thirty-six hours, until the plants are thoroughly dry, when they may be mounted in the ordinary way. It is best, if possible to place the plants as soon as possible after gathering them, carrying them in an airtight box and moistening them before pressing.

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THE NEW PHOTOGRAPHY AS A TEST FOR DIAMONDS AND JET.—The new photography seems likely to have many practical applications. At a recent meeting of the Paris Academy of Sciences, the transparency of the different varieties of carbon and of its non-metallic compounds to the 'X' rays, was stated to serve in distinguishing the diamond from such of its imitations as are made of substances that are opaque under similar conditions. Silhouettes of genuine and imitation diamonds were shown side by side, and it was stated that while prolonged exposure causes the silhouettes of diamonds to disappear, the imitations continue impervious to the rays. So, too, natural jet can similarly be distinguished from its mineral imitation. The genuineness of diamonds and jet may be shown, too, by interposing these substances between the Crookes's tube and paper covered with barium or potassium platino-cyanide, or other fluorescent substances. They project lighter shadows than their substitutes.

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ACROGAMOUS AND BASIGAMOUS FERTILISATION.—The interesting fact that the normal polarity of the embryosac is occasionally reversed, has been the subject of recent investigation by Professor Van Tieghem. The normal position of the embryonic vesicles and of the antipodal cells, he finds to be invariably maintained in those plants in which the embryosac is produced within the nucellus of a

tegumented ovule, with the apex turned toward the micropyle, whether the mode of impregnation be porogamic or chalazogamic. In certain of the *Loranthaceæ*, however, where the embryosac arises on the inner surface of the carpel, and where there is, consequently, strictly speaking, neither placenta nor ovule, the oosphere and the synergidæ are located at the lower, and the antipodal cells at the upper end of the embryosac. This mode of impregnation Van Tieghem would call *basigamous*, as contrasted with the ordinary acrogamous mode. A similar mode of impregnation, accompanied by chalazogamy occurs in certain of the *Balanophoraceæ* with naked ovules.

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A NEW ANTISEPTIC.—Metallic silver has been recently brought into use by Dr. Credé as a dressing for wounds, various micro-organisms being destroyed by contact with this substance. In the course of experiments with a loosely woven textile fabric, coated with metallic silver, Behring, Miller, Schill, and others found that the silver enters into combination with a peculiar secretion produced by the micro-organisms. This secretion contains lactic acid, and consequently lactate of silver is formed. This substance is very destructive to the micro-organisms; indeed, if they are treated with a solution of it which contains only one part in a thousand, the silver lactate kills them in five minutes. So sensitive are they to it, that a solution of one part in 50,000 sensibly retards their development. Dr. Credé was the first who made a practical application of silver lactate, causing it to be prepared for use under the name of 'actol.' He has now improved on this invention through the introduction of silver citrate, under the name of 'itrol.' This salt has not the irritating effect of the lactate, and while perfectly harmless, is described as having a very powerful antiseptic action when applied as a dressing, either in the form of ointment or powder.

QUERY COLUMN.

RULES.

1. Each correspondent is restricted to *one* question.
2. Each query must be accompanied by the *coupon* which appears on the back wrapper of the current number of the Journal.
3. Correspondents will oblige by stating, whenever possible, the source from which their query has been obtained.

The Editor of the PRACTICAL TEACHER reserves to himself the right to decline to answer any question which is, in his judgment, unsuited to the Magazine.

Scot.—If you will please comply with Rule 2 and repeat your query, it shall have best attention.

J. R. Jones.—We shall be pleased to post a full solution to your query if you will send your address to this office.

John Wood.—The solution you send is quite correct according to the formula used; but the formula you have used is only an approximate one. A better result is obtained by using the following:—

$$\frac{P}{W} = \frac{\tan(\alpha+\theta)\,r}{l}$$

Where W is the pressure exerted by the press.

P the force applied at the end of a lever of length l.

r the radius of the screw. (l and r both in inches.)

α the inclination of screw thread obtained when one thread (or turn of the screw) is unwrapped.

θ the angle of repose for the surfaces in contact.

In the example given—

$$\tan(\alpha+\theta) = \frac{\tan\alpha+\tan\theta}{1-\tan\alpha\,.\,\tan\theta} = \frac{\frac{1}{4\pi}+\frac{16}{100}}{1-\frac{16}{400\pi}}$$

$$= \frac{100+64\pi}{400\pi-16} = \frac{2108}{8688} = \cdot 243;$$

$$\therefore W = \frac{P\times l}{\tan(\alpha+\theta)\,r} = \frac{2\times 28\times 9}{\cdot 243\times\frac{1}{4}}$$

$$= 4148\cdot 15 \text{ lbs.}$$

For proof of formula used, refer to PRACTICAL TEACHER for last month (April 1896), page 572.

G. E. (Partick).—If z, x, y are in geometrical progression when a is subtracted from each, x, y, z when b is subtracted from each, and y, z, x when c is subtracted from each, show that—

$$\frac{1}{x-a}+\frac{1}{y-b}+\frac{1}{z-c} = 0.$$

(S. & A. Dept., 1891.)

If a, b, c are three quantities in G. P. then $b^2 = ac$.

$$\therefore (x-a)^2 = (z-a)(y-a) \quad \text{(i)}$$
$$(y-b)^2 = (x-b)(z-b) \quad \text{(ii)}$$
$$(z-c)^2 = (y-c)(x-c). \quad \text{(iii)}$$

From (i) $x^2-2ax+a^2 = yz-ay-az+a^2$;

$$\therefore a(y+z-2x) = yz-x^2,$$

$$\text{And } a = \frac{yz-x^2}{y+z-2x}.$$

From (ii) $y^2-2by+b^2 = xz-bx-bz+b^2$,

$$\therefore b(x+z-2y) = xz-y^2,$$

$$\text{And } b = \frac{xz-y^2}{x+z-2y}.$$

From (iii) $z^2-2cz+c^2 = xy-cy-cx+c^2$;

$$\therefore c(x+y-2z) = xy-z^2,$$

$$\text{And } c = \frac{xy-z^2}{x+y-2z}.$$

$$\therefore x-a = x-\frac{yz-x^2}{y+z-2x} = \frac{xy+xz-yz-x^2}{y+z-2x}$$
$$= \frac{(y-x)(x-z)}{y+z-2x};$$

$$y-b = y-\frac{xz-y^2}{x+z-2y} = \frac{xy+yz-xz-y^2}{x+z-2y}$$
$$= \frac{(x-y)(y-z)}{x+z-2y};$$

$$z-c = z-\frac{xy-z^2}{x+y-2z} = \frac{xz+yz-xy-z^2}{x+y-2z}$$
$$= \frac{(x-z)(z-y)}{x+y-2z}$$

$$\therefore \frac{1}{x-a}+\frac{1}{y-b}+\frac{1}{z-c}$$

$$= \frac{y+z-2x}{(y-x)(x-z)}+\frac{x+z-2y}{(x-y)(y-z)}+\frac{x+y-2z}{(x-z)(z-y)}$$

$$= \frac{(z-y)(y+z-2x)+(x-z)(x+z-2y)+(y-x)(x+y-2z)}{(x-y)(y-z)(x-z)}$$

$$= \frac{z^2-y^2-2xz+2xy+x^2-z^2-2xy+2yz+y^2-x^2-2yz+2xz}{(x-y)(y-z)(x-z)}$$

$$= \frac{0}{(x-y)(y-z)(x-z)} = 0.$$

Student (Preston).—From a body of soldiers drawn up in a solid square three ranks are taken from the rear to extend the column by four places. How many men were there altogether?

(Educ. Institute of Scotland.)

Let x = number of men on one side of the square.

Then x^2 = total number of men.

If three ranks are taken from the rear there will be left $(x-3)$ ranks. The depth of the column will be increased to $(x+4)$ men.

Then total number of men in the column

$$= (x+4)(x-3);$$

$$\therefore (x+4)(x-3) = x^2;$$

$$\text{Then } x^2+x-12 = x^2,$$

$$\text{And } x = 12;$$

$\therefore$ Total number of men $= (12)^2 = 144$.

Chas. Abbott (Acton).—If a perpetual annuity is worth 40 years' purchase, find what an annuity of £300 will amount to in 10 years at the same rate. Log $10\cdot 25 = 1\cdot 01072$, log $1280 = 3\cdot 1072$. (Hall & Knight's Elementary Algebra.)

If a perpetual annuity is worth 40 years' purchase, rate of interest $= \frac{100}{40} = 2\frac{1}{2}$, and £1 in one year amounts to £1·025.

Let the amount of £1 in one year = R.

At the end of the first year £300 is due.

At the end of the second year $300\,R + 300 = 300(R+1)$ is due.

At the end of the third year $300\,R(R+1)+300 = 300(R^2+R+1)$ is due.

At the end of the fourth year $300\,R(R^2+R+1)+300 = 300(R^3+R^2+R+1)$ is due.

At the end of the tenth year $300(1+R+R^2\ldots\ldots+R^9)$ is due.

The quantity within brackets is a G. P. whose first term is 1, common ratio R, and number of terms 10.

$\therefore 1 + R + R^2 \ldots\ldots + R^9$

$$= \frac{R^{10} - 1}{R - 1};$$

$\therefore$ Amount due at the end of 10 years

$$= \frac{300\,(R^{10} - 1)}{R - 1}.$$

But $R - 1 = 1{\cdot}025 - 1 = {\cdot}025 = \frac{1}{40}$;

$\therefore$ Amount due at the end of 10 years

$$= \frac{300\,(R^{10} - 1)}{\frac{1}{40}} = 12000\,(R^{10} - 1).$$

$R = 1{\cdot}025$,

$\therefore \log R = {\cdot}01072$,

$\therefore \log R^{10} = {\cdot}01072 \times 10 = {\cdot}1072$.

But since $\log 1280 = 3{\cdot}1072$, $\log 1{\cdot}28 = {\cdot}1072$;

$\therefore R^{10} = 1{\cdot}28$, and $R^{10} - 1 = {\cdot}28$;

$\therefore$ Amount due at the end of 10 years

$= £(12000 \times {\cdot}28) = £3{,}360.$

J. T. Luckett.—You have not sent the coupon for the *current* number of the Journal. If you repeat your question, enclosing the coupon for this issue, it will be answered next month.

James Stirling (Glasgow).—How many numbers are there between 999 and 10,000, in expressing which not more than two different digits are used?

(N.B.—Zero counts as a digit.)

In each of the numbers there are exactly four digits.

A.—Numbers containing one digit only (*e.g.* 2,222), since 0 cannot be that digit, = 9.

B.—Numbers containing two digits.

1. Including 0. Note that 0 cannot come first.

(*a*) Numbers with one significant figure followed by three 0's (*e.g.* 2,000) = 9.

(*b*) Numbers with one significant figure followed by two 0's and the same significant figure (*e.g.* 2,002, 2,020)

= 9 × number of permutations of three things, of which two are like,

$$= 9 \times \frac{\lfloor 3}{\lfloor 2} = 9 \times 3 = 27.$$

We cannot permute *all* the four figures, as that would in some cases make 0 the first figure.

(*c*) Numbers with one significant figure followed by one 0 and the same significant figure repeated twice

= 9 × number of permutations of three things, of which two are like,

$$= 9 \times \frac{\lfloor 3}{\lfloor 2} = 9 \times 3 = 27.$$

2. Excluding 0.

Number of combinations of nine digits taken two together

$$= \frac{\lfloor 9}{\lfloor 2 \lfloor 7}$$

$$= \frac{9 \times 8}{2} = 36.$$

The numbers containing two significant digits may be divided into—

(*a*) Those containing each of the digits twice.

(*b*) Those containing the first digit once, and the second three times.

(*c*) Those containing the first digit three times, and the second once.

Since if we exclude 0 any digit may take any position, we can permute *all* the four digits.

Of (*a*) there are 36 × number of permutations of four things, which are alike two and two,

$$= 36 \times \frac{\lfloor 4}{\lfloor 2 \lfloor 2} = 36 \times 6 = 216 \text{ numbers.}$$

Of (*b*) there are 36 × number of permutations of four things, of which three are alike,

$$= 36 \times \frac{\lfloor 4}{\lfloor 3} = 36 \times 4 = 144 \text{ numbers.}$$

Of (*c*) there are 36 × number of permutations of four things, of which three are alike,

$$= 36 \times \frac{\lfloor 4}{\lfloor 3} = 36 \times 4 = 144 \text{ numbers.}$$

$\therefore$ Total number of numbers

$= 9 + 9 + 27 + 27 + 216 + 144 + 144$

$= 576.$

Frank E. Smith.—In Walter Scott's Science Series you will find a book on the 'Ice Age,' by Sir Robert Ball, which will furnish you with the needful information.

LEGAL AND CODE QUERY COLUMN.

☞ *N.B.—Our Replies in this column are not restricted to matters which are strictly professional. We shall be pleased to answer questions on legal difficulties which arise in connection with the private business of our readers, and also to give information on subjects of general interest. In fact, we will spare no trouble which may be necessary in order to answer in this column any reasonable question forwarded by a reader.*

RULES.

1. All communications must be addressed 'Legal Editor, PRACTICAL TEACHER, 33, Paternoster Row, E.C.' and must be accompanied by our 'coupon.'
2. Replies will be given *only* in this column, except under the conditions named in Rule 3.
3. If any reader desires a reply by post, such can be forwarded by enclosing, in addition to the coupon, a stamped addressed envelope and either stamps or a Postal Order to the value of one shilling.
4. No original documents should be forwarded, but copies only. We cannot hold ourselves responsible for any losses which occur through non-observance of this rule.

Private School.—'MAGISTER.'—I am asked by the proprietor of a private school:—'Can I prevent my late assistant from opening a rival establishment in the town in which my school is situate?' You do not state whether in the contract which existed between yourself and the assistant there was a clause by which he agreed not to set up on his own account within a given area. If so a Court will either enforce obedience to that clause by way of injunction, or will award you damages for its breach should the necessity therefor arise. In default of such a clause you have no remedy. For the benefit of my other readers who are proprietors of such schools, I advise that in all agreements such a clause should be inserted in the memorandum of agreement between them and their assistants.

'*I.O.U.*'—M. G.—No stamp is needed. The document can be produced as evidence in an action. Sue him in the County Court.

Population of London.—'CENSUS.'—In 1881 the figures were returned as 3,815,544, and in 1891 as 4,211,743.

Civil Service.—'4TH YEAR P.T.'—You do not state the name of the branch about which you require information. If you obtain 'Clark's Civil Service Annual' you will find there full particulars as to all branches. The price is 2*s.*, and the publishing office is 2, Chancery Lane, London.

Loan.—'L. R.'—If you are a member of the National Union of Teachers you can obtain a loan on fulfilling certain conditions at a very low rate of interest. I think 2½ per cent. Send to The Secretary, Loan Department, 71, Russell Square, W.C., for full particulars.

'*Keeping-In.*'—RURAL MISTRESS.—This is a form of punishment which appears to be very common, but it is my personal opinion that it should be discouraged both by School Board and managers, as it has the effect of lengthening the hours of work of the assistants and pupil teachers. Besides, there is little doubt that the practice is illegal.

Will.—'MARY.'—Send a letter to Somerset House, London, asking the question you put to me. With the letter send stamps to the value of 1*s.*, this being the amount of the 'search-fee.' Should the will be there you can obtain a copy on payment at the rate of 6*d.* per folio.

Women Teachers in Boys' Schools.—MANAGER.—The Education Department are 'not disposed to look with favour

on this arrangement.' They 'consider it very far from desirable that young women should be employed in a boys' school with its ordinary staff, unless a more complete supervision than is ordinarily practicable or possible be exercised by the managers.'

Certificate Examination.—G. W.—Yes, for successes in either May 1895 or May 1896, provided they are in different subjects.

Landlord and Tenant.—G. T.—The notice is valid if delivered before 12 o'clock midnight.

School Staff.—A. G.—(1.) The head-master has no power in the matter, it is a question for the school authority. (2.) Entries in a log-book should record matters of fact, not opinions. (3.) You cannot *claim* to inspect the entry, but in fairness to you such inspection should be permitted. (4.) I do not know the nature of the entry, so can give no opinion as to the probability of damage accruing to you as a result of such entry.

Landlord and Tenant.—M. R.—Yes; the rent has to be paid until the termination of the tenancy period, even if the house is not tenable owing to the occurrence of a fire.

Seventeen and Sixpenny Limit.—G. L. S.—This limit was imposed in 1876. Its immediate effect was to lower the voluntary subscriptions in three years from 8*s.* 8½*d.* per head to 7*s.* 8½*d.* per head. Since then there has been a steady decrease in these subscriptions, until in 1894 the amount per head reached only 6*s.* 6½*d.* per head. If the limit is either removed or raised, it is thought by many persons that voluntary effort will still further diminish. On the other hand, a strong section advocate the entire abolition of the limit, believing that such abolition will stimulate voluntary effort.

Devolution of Estate.—SCHOOLMISTRESS.—One-third to you and the remainder to the children. You have been incorrectly informed as to your having an absolute and exclusive title to 500*l.* Such a title only arises under the provisions of 'The Intestates' Estates Act, 1890,' when there is no child.

Dismissal.—R. L.—The notice you have received is invalid. If you are a member of the National Union of Teachers send on particulars to its Legal Department. If not, consult a solicitor practising in your neighbourhood if you are prepared to incur the necessary expense, which will be considerable.

Use of Schoolrooms.—SCHOOL MANAGER.—The following is the text of the section which deals with the question you raise:—'The Returning Officer at the Parliamentary Election may use, free of charge, for the purpose of taking the poll at such election, any room in a school receiving a grant out of the moneys provided by Parliament, and any room the expense of maintaining which is payable out of any local rate, but he shall make good any damage done to such room, and defray any expense incurred by the person or body of persons, corporate or unincorporate, having control over the same on account of its being used for the purpose of taking the poll as aforesaid.' (35 & 36 Vict. c. 33. s. 6.)

Pupil Teachers' Time Table.—R. T. M.—The Inspector is not doing more than his duty. Read carefully paragraph 8 of Appendix VI. to 'Instructions to Inspectors.'

OUR 1896 CERTIFICATE CLASS.

BY J. C. HOROBIN, M.A.,
Principal, Cavendish College, Cambridge.

FIRST YEAR—MEN.

Reading, etc.

See November number.

Penmanship.

Write in text and small hand:—

'In games may be detected the mainspring of the moral strength of children.'

Spelling.

Write from dictation:—

A sound exercise of the judgment | has a remarkable influence | in producing | and maintaining that tranquility of mind | which results | from a due application of its powers, | and a correct estimate | of the relations of things. | The want of this exercise | leads a man | to be unduly engrossed | with the frivolities of life, | unreasonably elated | by its joys, | and unreasonably depressed | by its sorrows. | A sound and well regulated judgment | tends to preserve | from all such disproportioned pursuits | and emotions | by leading us | to view all present things | in their true relations, | and to estimate aright | their relative value. | It does so | in a more especial manner | by leading us | to compare the present life, | which is so rapidly passing over us, | with the paramount importance | and overwhelming interest | of the life which is to come.

School Management.

1. What is meant by the 'association of ideas'? Give examples of different kinds of mental association, and show what practical bearing this question has on a teacher's work.

2. Describe the cause and the cure of the habit of vague and inaccurate observation.

3. What is the exact meaning of each of these words: *Reminiscence, Recollection, Memory?* Give some simple practical rules with reference to the character and right use of memory exercises in schools.

4. In what order should the mental faculties of children be called into exercise? Point out especially the objects which should be kept in view in the training of infants as distinguished from older children.

5. What is meant by the faculty of attention? How does it operate, and how far is its exercise an act of the will? Mention some devices by which a teacher can strengthen in his pupils the habit of close attention.

6. What are the three conditions which are laid down in the Education Code, to be fulfilled in an Infant School or Class? Of all these, which seems to you the most important, and why?

Composition.

Write a short essay on:—

(*a*) The limits of the use of corporal punishment as a means of discipline.

(*b*) A voyage to New Zealand viâ the Cape.

Music.

1. What other four contiguous tones of the scale are separated by the same steps or intervals as (1) *me, fah, soh, lah,* and (2) *ray, me, fah, soh?*

Semitone. Tone. Tone.

(1) *me fah soh lah.*

Tone. Semitone. Tone.

(2) *ray me fah soh.*

2. Which are the leaning or expectant tones of the scale, and which are the strong tones or tones of repose?

3. What circumstances tend to modify the mental effects of scale tones?

4. Name (as major third, etc.) the following intervals: (1) **r t**; (2) **t, s**; (3) **r l**; (4) **f t**; (5) **m d'**; (6) **t, f**; (7) **r f**; (8) **f e l**.

5. Re-arrange the following notes in order of pitch, placing the lowest note first in each case: (*a*) **s d, m r' t, f e d s, t a l, r**; (*b*) **ta, m r' f t, f e l d m' s l,**.

6. Which of the following notes is highest in pitch, and which lowest? (1) **t,** in key C; (2) **l,** in B♭; (3) **m,** in key A♭; (4) **r,** in key D; (5) **f** in key B.

Geography.

1. Draw maps of:—
   (*a*) North Island.
   (*b*) Basin of the Ganges.
   (*c*) Queensland.

2. State the situation of the colony of Victoria, describing its climate and products. What do you know of its history?

3. What do you know of Patna, Dacca, Poona, Karachi, Negapatam, Agra, Meerut, Ambala, Rawal Pindi?

4. Give a short account, geographical, historical, and commercial, of Northern Zambesia.

English.

1. Illustrate from the poems the following description of Gray:—

'He was the first discoverer of the beauties of nature in England.'

2. Scan the first four lines of 'The Bard.'

3. Annotate: Buff, brawls, panel, conceits, graved, swain, pious.

4. Analyse Milton, page 21, lines 10–21.

5. Give a summary of Milton's 'Tractate.'

History.

1. What do you know of Langton, Wallace, Spenser, Hampden?

2. Describe the policy and enumerate the Acts of the elder Pitt.

3. Give the principal divisions of the Magna Charta, Act of Uniformity, Act of Union (Ireland).

4. Describe in order the chief measures of the Parliament which met in 1529 and lasted until 1536.

5. In what way was the destruction of the monasteries disadvantageous, and how were the evils met in the reigns of Edward VI. and Elizabeth?

6. Comment on the statement: 'The reign of Edward VI. was a time of nominal Protestantism discredited by bad government; that of Mary a time of nominal Catholicism discredited by cruelty and national failure.'

Arithmetic.

1. Simplify—

$$\left\{\frac{11\frac{3}{4}-10\frac{1}{2}}{11\frac{3}{4}+10\frac{1}{2}} \div \frac{10\frac{3}{8}+11\frac{1}{2}}{10\frac{3}{8}-9\frac{1}{2}}\right\} \times \frac{\frac{9}{7}+\frac{9}{11}}{\frac{9}{7}-\frac{9}{11}}.$$

2. A cistern can be filled by 1 tap in 3 hours, by another in 3 hours and 40 mins., and emptied by a third in 2 hrs. 20 mins. If they are all opened together, in what time will the cistern be filled?

3. A train 88 yards long overtook a person walking along the line at the rate of 4 miles an hour, and passed him completely in 10 seconds; it afterwards overtook another person, and passed him in 9 seconds. At what rate per hour was this second person walking?

4. A boat is rowed 1 mile in $5\frac{1}{2}$ mins. Another boat is rowed the same distance in $5\frac{3}{4}$ mins. If they start simultaneously from opposite ends of a 4-mile course, at what distance from either starting point will they meet?

5. Two boats row a race over a straight course 1 ml. 995 yds. long, their rates of speed being 12 mls. and $11\frac{23}{29}$ miles an hour respectively. Assuming that sound travels at the rate of 1,140 feet a second, find how much the faster boat will be ahead of the other when the sound of the gun fired at starting is heard at the winning post.

6. A person rows a distance of $1\frac{1}{2}$ mls. down a stream in 20 mins., but without the aid of the stream it would have taken him $\frac{1}{2}$ an hour. What is the rate of the stream per hour, and how lohg would it take him to return against it?

Algebra.

1. Prove that if the difference of two quantities $= \frac{p}{q}$, then p times their sum $= q$ times the difference of their squares.

(*b*) Find the value, when $x = 3$ of

$$\frac{x}{2} - \left\{\frac{2x-3}{3} - \frac{3x-1}{4}\right\} - \frac{3x+1}{4}.$$

2. Resolve into elementary factors:—

(*a*) $x^4 - 81$.

(*b*) $a^2(b-c) + b^2(c-a) + c^2(a-b)$.

(*c*) $x^2 + x - 156$.

3. Find G.C.M. of $x^5 - 2x^4 - 3x^3 + 14x - 16$ and $x^5 + 2x^4 - 3x^3 + 2x + 16$.

4. Find value of:—

$$\frac{x^2(y-z)^2}{(x+z)^2-y^2} + \frac{y^2-(z-x)^2}{(y+x)^2-z^2} + \frac{z^2-(x-y)^2}{(z+y)^2-x^2}.$$

5. Prove $a^{-m} = \frac{1}{a^m}$ and $a^0 = 1$.

6. Solve the equations:—

(*a*) $x + 5 - \frac{8}{x+5} = 7$.

(*b*) $\frac{3x-(a+b)}{4c-(c+a)} = \frac{3x-(a+c)}{4x-(b+a)}$.

(*c*) $x^2(y+1) + y^2(x+1) = 19.$
$xy + 6 = 0.$

7. (*a*) Find the sum of n terms in G.P. when the first term and the common ratio are given.

(*b*) Sum to infinity $5 - 4\frac{1}{2} + 4\frac{1}{20} - \ldots$.

8. A hare is 72 of its leaps before a greyhound, and takes 9 leaps to his 5; but 3 of the greyhound's leaps are equal to 7 of the hare. How many leaps will the hare make before it is caught?

Euclid.

1. Prove I. 32. Inscribe a square in a given equilateral triangle, having its base on a given side of the triangle.

2. Prove I. 34. The bisectors of two adjacent angles of a parallelogram are at right angles.

3. Prove I. 35. The right lines which join transversely the extremities of two equal and parallel right lines bisect each other.

4. Prove II. 12. ABC is a right-angled triangle, and BD is a perpendicular on the hypotenuse AC. Prove AB, DC = BD, BC.

5. Prove III. 26. If the opposite angles of a quadrilateral be supplemental it is cyclic.

6. Prove III. 28. The line joining the feet of perpendiculars from any point in the circumference of a circle, on two diameters given in position, is given in magnitude.

SECOND YEAR—MEN.

Reading.
Penmanship.
Composition.
Geography.
History.
} As First Year.

Teaching.

See November number.

School Management.

1. (*a*) In the Class Registers, how will you ensure the *correctness* of (i.) the number entered at every meeting at the foot of the attendance column? (ii.) of the 'total attendances' of the week, and of the quarter? How would you deal with the registration of scholars who come too late to be marked in the registers? and how would you mark holidays and days devoted to Examinations in Religious Knowledge?

(*b*) (i.) If the school attendance is irregular, describe in what form you could, from the Registers, draw up a statement to put this irregularity in a striking light? (ii.) How do you find the average number of times attended per week by each child present at all? and of what use is this number? (iii.) How would you record *punctual* attendance? (iv.) Why would you write up the daily attendance in view of the school?

2. It is more difficult to secure good *tone* in a Day School than in a Boarding School. Why? In what way, whether by precept or example, may a right tone be best maintained in an elementary school?

3. Write a pattern sketch of a lesson on these subjects:—
(1) Early hours; (2) Digestion; (3) The need of law and of obedience, (*a*) in the school, and (*b*) in the home.

4. In what various ways may children be rewarded for good conduct and proficiency in their studies? Say what kinds of reward appear to you to be most legitimate, and what kinds are open to objection.

5. Give the dimensions of a schoolroom capable of accommodating a hundred children comfortably. How should you propose to heat and ventilate it?

6. How far was Froebel indebted to Pestalozzi, and in what respects did he improve upon his teaching?

Euclid.

1–6. As First Year.

7. Prove IV. 12.

Inscribe a regular octagon in a given square.

8. Prove VI. 8.

If two circles touch externally, their common tangent is a mean proportional between their diameters.

Algebra.

Questions 1–8 as first year.

1. State and prove those properties of logarithms by help of which multiplication, division, and the extraction of roots can be replaced by easier arithmetical calculations.

Given log. 1 and log. 2, find log. 3·2, log. $14\frac{2}{3}$, log. ·0054, log. ·18.

2. Show that the advantage per £1 for a year of having interest paid m times a year is approximate $\frac{m-1}{2m}r^2$, r being a small fraction.

3. The number of permutations of $2n+1$ things, $n-1$ together: the number of permutations of $2n-1$ things, n together :: 3 : 5; determine n.

4. Find the greatest term in the expansion of $(1+x)^n$ when n is a positive integer.

Find the coefficient of the term involving $x^n y^n$ in the expansion of $(1 + x + y + xy)^{2n}$.

5. Solve the equations:—

(*a*) $\frac{2x+1}{29} + \frac{471-6x}{2} = 9 + \frac{402-3x}{12}$.

(*b*) $x^2 + y^2 = \frac{13xy}{6}$

$x^3 + y^3 = \frac{25xy}{6}$.

(*c*) $3x + 4y + z = 4$

$x + y + z = \frac{11}{6}$

$3x + 2y = 22$.

6. A man bought a number of £100 railway shares when they were at a certain rate per cent. discount for £900, and afterwards sold them all but one for £990, the premium being at the same rate per cent. How many were there, and what did they cost?

Music.

1. Write the names (as minor third, etc.) of the following intervals:—(1) *doh* to *sc*, (2) *me* to *de*^{1}, (3) *ray* to *la*, (4) *doh* to *re*, (5) *se*, to *fah*, (6) *re* to *soh*.

2. Write the names for the following notes:—(1) *ray* sharp, (2) *lah* flat, (3) *me* flat, (4) *fah* sharp, (5) *soh* sharp, (6) *ray* flat.

3. Re-write the following passages on the perfect method. Regard the first note in (1) as *me*, and the first note in (2) as *soh*.

(1) l ta s f d^1 ta s m d^1 r^1 ta l s m f
(2) r s fe l r d t, fe s l fe r m fe s

4. Re-write the following, doubling the value of each note and rest (*i.e.* write in two pulses what is here given in one pulse):—

| s .s,l :s .,f | m .r :d |

| .,d :r., | s 3 .lsf :m .d ‖

5. Fill up two measures of each of the following kinds. Use at least ten notes in each two measures. Begin each measure with a strong accent. (1) Four-pulse; (2) six-pulse; (3) three-pulse.

English.

Gray.—As First Year.

Richard II.

1. What were the particular accusations of Bolingbroke against Norfolk, Bagot, Aumerle?
2. Annotate fully: Sullen, coffin, still breeding, badges, balm, trade, puny.
3. What notions do we gather from this play as to the relations between the king and his barons?
4. Give an account of the Deposition scene.

Tempest.

1. Comment on the circumstances which culminate in the exclamation:
'Misery acquainst a man with strange bedfellows.'
2. Comment on the statement:—
'Miranda is far removed from all comparison with her own sex.'
3. In what shapes does Ariel appear? If Ariel is visible only to Prospero, what is the *raison d'être* of the variation?

Macbeth.

1. Under what circumstances, and by whom is it said:—
'Throw physic to the dogs.'
'Tis called the evil.'
2. Scan:—'A sailor's wife had chesnuts in her lap.'
3. Show that Lady Macbeth is the exact antithesis of her husband.

FIRST YEAR—WOMEN.

Reading.
Penmanship.
School Management.
Composition.
Music.
English.
History.
Geography.
} As First Year Men.

Domestic Economy.

1. What is meant by 'Jerry-building?' Name the defects and dangers of such a mode of constructing houses.
2. Give the principal rules for keeping a dwelling in cleanliness, healthiness, and comfort.
3. Explain the effects on the body of wearing wet or damp boots and clothing.
4. When and how does air cease to be 'fresh'? Explain clearly the effects of a poisoned atmosphere.
5. What is said to be the 'line of comfort' with regard to the temperature of a room? Describe the various methods of diffusing artificial heat.
6. Name the most effective ways of ventilating (1) a schoolroom, and (2) a bedroom.

Arithmetic.

1. If a tradesman with a capital of £2,000 gain £50 in three months, how long will it take him with a capital of £3,000 to gain £175?
2. What will £200 amount to in 3 years at 4 per cent. per annum, compound interest?
3. What is meant by 'discount'? How is it calculated? give an example.
4. A dealer bought £1 worth of steel pens at 1s. 4d. per box, each containing one gross, and retailed them 2½d. per dozen; what did he gain on his outlay.
5. A person sold £20,700 in the 3 per cents. at 92½, and invested the proceeds in Canada 5 per cents. at 103½; what was his increase of income?
6. At what rate per cent. will £136 17s. 6d. amount to £164 5s. 6½d. in 6¼ years?

SECOND YEAR—WOMEN.

Reading.
Penmanship.
School Management.
Teaching.
Composition.
Music.
English.
History.
Geography.
} As Second Year Men.

Domestic Economy.

1. Describe fully the process of making bread.
2. Give recipes for making (1) beef-tea, (2) mutton broth, (3) pea soup.
3. Give some simple rules for the management of a school savings bank. Should it be permissible to use the bank for the savings of the parents? if not, why not?
4. 'High interest,' it has been said, is only another name for 'bad security.' Explain this, and give examples of some forms of investment for savings which a prudent person should avoid.
5. An invalid is advised to abstain for a while, as far as possible, from nitrogenous food. What diet is best suited for such a person, and why?
6. Name the principal disinfectants, and explain in what way to use them.

Arithmetic.

1. No. 1. Men.
2. A milk dealer buys pure milk at 11½d. per gallon; how much water must he add that he may sell at 5d. a quart to obtain a gross profit of 100 per cent.?
3. No. 4. Men.
4. No. 2. Men.
5. No. 3. Men.
6. An excursion train, a quarter of a mile long, leaves a station at 8 hours 22 mins., and travels at the rate of 40 miles an hour, the ordinary train, which travels at the rate of 66 ft. per second, leaves the station at 8 hours 26 mins., and follows the other. How soon afterwards may a collision be expected?

EDUCATION ABROAD.

THE new Prussian Bill to provide for the payment of elementary school teachers has passed the Committee stage without substantial modification.

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IN the Italian Chamber of Deputies, Sgr. Morandi recently proposed that the Minister of Public Instruction should shorten the hours of attendance in elementary schools, and should allow the passage from one class to the next, at the end of the year, without examination. The Minister, Sgr. Gianturco, did not see his way to put these two proposals into practice at once, on account of the trouble which they would have caused in the sessions already begun. But he approved them in principle, and they will probably come into force in the coming year.

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IN Hanover, on the other hand, the shortened school hours in the rural districts have been restricted, the full course having been extended till Midsummer. The teachers hail this measure as beneficial to the prospects of education in the Province.

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THE Provincial School Committees in Prussia have been requested to provide a more thorough individual preparation for teachers in training, in view of the increased term of military service to which they will shortly be subjected.

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THE danger of letting bits of pencil get into the ear is drastically illustrated by the death of a clergyman in Berlin. He shot himself, and a post-mortem examination showed that the point of a slate pencil had entered his ear and produced extensive meningitis. It also appeared probable that the pencil point had been there since the early youth of the man. A similar case is quoted in the *Deutsche Blätter* from a German school, where a boy of 10 was found by his teacher to suffer from increasing deafness. An investigation showed extensive suppuration, swelling, and contraction of the auditory meatus. After cleaning with a spraying bottle, a foreign body was discovered next the drum surrounded by pus. It was brought out by continued washing, and found to be the point of a slate pencil. The boy had complained of headache, humming of the ears, and giddiness on stooping. After a thorough cleaning the ear was completely cured in a fortnight. The incident shows the importance of an early diagnosis, and the extremely valuable, indeed the life-saving power of the attentive teacher.

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THE Berne section of the *Schweizerische Lehrerverein* proposes to the Swiss teachers to try and obtain a subvention from the Confederation for the cantons, by direct initiative. This is made possible by the peculiar constitution of the Swiss Federation. It is necessary to obtain 50,000 signatures to the proposal; after this formality, the Federal Chambers are bound to submit the question to the vote of the people. It will be interesting to observe if the *Verein* will endorse the Berne proposal.

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UNDER the name of *Die Kinderfehler*, a new journal, dealing with juvenile faults, has just been issued under the editorship of J. Trüper, the director of the educational hospital at Sophienhöhe, near Jena. The first number contains some very interesting contributions. F. Kölle, of Zürich, deals with six cases of boys suffering from epilepsy, and showing extreme symptoms of moral aberration. The Rev. W. D. Morrison gives the history of Robert Coombes, the Plaistow murderer. William S. Monroe contributes an article on the care of mentally and physically abnormal children in the United States. Paola Lombroso writes on educational psychology in Italy, and Lucien Arréat upon the progress of the same department of knowledge in France. The whole number forms a valuable addition to the international study of hygiene and pedagogy.

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THE city of Munich had, at the beginning of this year, 416 acting and 44 pensioned male teachers, and 374 acting and 37 pensioned female teachers. The pensioned male teachers had an average age of 52 years, and an average duration of service of 31 years. The female teachers were 44 years old on the average, and had served 24 years. This shows that male teachers can stand the work longer before they have to retire as unfit for further service.

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THE last report of the Bombay Educational Department shows a slight decrease in the number of public institutions, from 9,939 to 9,871, but this decrease does not appear to have affected the attendance in any way, which advanced from 594,510 to 607,806. This is encouraging, as indicating greater consolidation and concentration in existing public schools. There is a larger average attendance at each school in the Bombay Presidency than in any other. Roughly speaking, twice as many pupils attend a public school in Bombay as in Madras. There is still a large number of indigenous schools in the Presidency. These schools are not recognised by the Department, nor are they subject to Government inspection, and hence the quality of instruction given in them is very unsatisfactory. It is hoped that strenuous efforts are being made to bring these schools under Departmental influence. Higher education is probably, as in Madras, chiefly confined to the Brahmin class. In the Government Order reviewing the report reference is made to the backward condition of the Mahomedan community. Though the total number of Mahomedan pupils undergoing instruction (135,390) is not disproportionately small as compared with 383,426 Hindu pupils, still of the former only 58 were undergoing University education, and only 2,490 were attending secondary schools. The greater majority of the Mahomedan pupils were in indigenous Koran schools. The Bombay Government has not as yet taken any special steps to improve the educational conditions of the depressed and down-trodden classes. The example set by the Madras Government in this respect will, it is hoped, be followed in other provinces. A very large number of the secondary schools in this Presidency, and almost all the secondary schools for girls, are under private management. In primary education also the Government of Bombay takes little or no direct part. Local boards support and conduct half the schools, and native states half the remainder. Bombay is still behind Madras in provision for the training of teachers.

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THE first school shower-bath in Berlin has, so far, been a great success. The bath is arranged in the cellar of the school house, and is provided with plenty of light and air and heating apparatus. The room contains 28 dressing and 14 bathing cells. The water is specially warmed to an initial temperature of 86° F., which after two minutes is cooled by the reduction of the hot water supply. The boys and girls of the middle and higher grades are admitted to the baths, not the youngest ones, as they would often require assistance in dressing. Bathing linen is supplied by the pupils themselves. It is immediately dried after use and taken home after school hours. Every child has one bath per week. They bathe in batches of 14. They take 25 minutes as a rule to go down, undress, bathe, dress, and come up again. Since the number of the dressing cells is twice that of the bathing cells, each batch can follow the preceding one in about a quarter of an hour. The children are not superintended on the way, and the bath is not compulsory. From one-half to three-quarters of the boys took advantage of the baths during the last session, according to the season. Girls bathed less on the average. The chief causes militating against bathing were fear of taking cold, untidy underclothing, and the lack of proper bathing linen. But there was a great improvement in personal cleanliness and general health. It remains to be seen whether the tuition does not suffer by the interruption of 25 minutes per week, but the answer can hardly be doubtful.

THE CLASS TEACHERS' COLUMN.

BY C. H. MOORE.

Ex-President of the National Federation of Assistant Teachers; Member of Executive N.U.T., etc.

SINCE I last wrote in this column the Education question has assumed definite shape, and the country is face to face with the proposals of the Government. In the interval, also, the annual assembly of the Teachers' Parliament has been held. Both these events have considerable bearing on the future position of the class teacher. First let us examine the Bill which is to make further provision for education in England and Wales. From a class teacher's point of view the proposal to appoint the County Councils as educational authorities is one of serious importance. In considering the various clauses of this Bill it should be borne in mind that the profession of class teaching is now a separate and distinct calling. The class teacher belongs to a professional community which occupies a permanent position in connection with the administration of national education. Hence it is obvious that the proposals of the Government on this question must of necessity vitally affect him, not only as an individual unit in the great profession, but they concern as a body the important class to which he belongs. Now the great majority of the class teachers is to be found in the service of the important School Boards throughout the country, and any legislation dealing with the powers of School Boards must deal directly or indirectly with the position of the Class Teacher. It goes without saying that the outcome of the present Bill will be to materially affect the powers of School Boards. The policy of the N.U.T. has always been in the direction of securing larger School Board areas. The decision of the Brighton Conference in favour of electing the educational authorities *ad hoc*, and the resolution of the Assistants' Conference at Burton, in October last, in favour of the principle of Universal School Boards, are strong indications of the direction in which the teachers of the country desire that the management of schools should trend. I strongly advise every class teacher to give careful attention to the details of the Bill, and to be prepared to assist in a full discussion of the whole question when it comes before the local associations for consideration. With the political aspect of the situation, we, as teachers, need not deal. As citizens we can approach the Bill, each according to his inclination. In our association meetings our duty is to demonstrate clearly the educational necessities of the country, and, as experts, to guide public opinion into such channels as make for the greater educational equipment of the nation.

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THE meeting of class teachers held at Brighton was in many respects a remarkable one. The hospitality of our Brighton colleagues cannot be too highly commended. One of the most pleasing results of the development of the national movement on the part of the class teachers has been the establishment of such fraternal gatherings as that of Easter Monday evening. The feature of the evening was the presentation of the resolution of the Burton Conference engrossed on vellum to the editor of the *Schoolmaster*. A somewhat unique item was the address of Mijnheer Th. M. Katelaan (secretary of the Dutch Class Teachers' Association). In a remarkably able address, delivered in English, M. Katelaan showed that the policy of the class teachers of Holland was in many respects similar to that of the class teachers in England. On several matters, however, it was to be remarked that the Dutch class teachers were far in advance of their English confreres. They issue an organ of their own, *The Messenger*, and they have succeeded in securing the adoption of the principle of staff conferences in order to deal with the management and conduct of their schools. A private meeting of the class teachers attending the Conference was held at the close of the proceedings. These annual gatherings are of the utmost value, and I trust that they will long be continued.

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DURING the past month steps have been taken to secure the establishment of associations of class teachers at Rochdale and at Burnley. I presume that both these organisations, when in working order, will become affiliated to the National Federation. The report of the Secretary to the Federation (Mr. W. H. Totterdill), which was presented to the Federal Committee at Brighton, showed that a material increase in membership will be forthcoming for the current year. The percentage of members of the Federation who are also members of the N.U.T. has made a record leap. I foresee that in the near future every member of the Assistants' Federation will be a member of the greater Union. This is a consummation which every true unionist must desire to see realised.

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THE class teachers in the service of the Gravesend School Board have petitioned their Board for a more favourable consideration of the local scale of salaries. They have undoubtedly established their claim for more generous treatment, and I trust to be able to state in my next contribution that the Gravesend School Board have realised the injustice of being behind the times in the method of remunerating the fully qualified practitioners in their service.

* * * * *

AT the Brighton Conference of the N.U.T. I succeeded in securing the adoption of an amendment to the resolution defining the basis of membership, which should have the effect of precluding the admission for the future of the Ex-Pupil Teachers to the Union. In moving this amendment my object was to ensure that the Union shall be in the future constituted of fully qualified practitioners only. It will be remembered that at the Leeds Conference five years ago we resolved that the Ex-Pupil Teacher should be compelled to obtain his or her diploma within five years of passing the Scholarship examination. This principle has since that time remained part of the policy of the N.U.T. It appears to me that the time has now arrived for the N.U.T. to declare that the teacher's diploma should be the qualification for membership of the Union. I mention this matter here because I am aware that a number of the class teachers' organisations are constituted of members of all grades. Is it not highly necessary that steps should be at once taken to place all associations on an uniform basis? Cannot we manage to secure the introduction of the word 'Certificated' into the title of the Federation? I com-

mend the suggestion to the members of all local associations of class teachers.

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Several of my correspondents ask me to express some opinions on the position of the class teachers under the Portsmouth School Board. As this matter is still *sub judice*, and as I believe that the question cannot be in more capable hands than at present, I think that it will be obvious that it is extremely inadvisable for me to comment on the case at this juncture. To those of my colleagues who are anxious about the position of our Portsmouth confreres I commend a perusal of the proceedings of the Brighton Conference on the subject.

* * * * *

The next meeting of the Federal Committee is fixed to take place at Northampton on Saturday, June 27th. Might I suggest to the officials of local associations of class teachers that they should note the addresses of the members of the committee, and if any member is likely to pass through their district on his way to Northampton, it would be well if a meeting of the local association were called for Friday evening the 26th, and that particular member invited to deliver an address. This is a convenient and an economical method of securing a deputation from the Federal Committee. The association need not necessarily be affiliated to the Federation.

VISITS OF INSTRUCTION.

I.—MESSRS. DOULTON AND CO'S LAMBETH POTTERY WORKS.

One of the most valuable concessions made in recent Education Codes is that which permits groups of scholars to be taken, in charge of a teacher, during school hours to museums, picture galleries, public buildings, and other places where the observing faculties can be reasonably exercised, and sound instruction of a very practical character obtained; for such is our interpretation of the phrase 'places of educational value.'

That the importance of the practical side of education is becoming more widely recognised, is shown in the establishment of manual training centres, in the requirement of object lessons introductory to elementary science teaching as the first 'class subject' in Primary Schools, and in the encouragement given to physical exercises. All this affords ground for the hope that a wise use will be extensively made of the above-mentioned permission.

No one who has given the plan a trial, and witnessed the eager interest which a band of boys or girls display when brought into the presence of collections of strange, wonderful, or beautiful objects, can doubt for a moment the real value of this mode of instruction. The sense of actuality enforces attention and impresses the memory in a degree which is only equalled by the best form of experimental and object teaching. To ensure the full benefit of such teaching for the pupils it is, of course, necessary that the teacher or some other guide should direct attention to the most important things to be observed, and supply such explanatory comment as may assist the understanding of their nature, their history, or their relation to life.

As a means of helping teachers to realise the advantages of this form of teaching, and suggesting ways of turning the permissive clause of the Code to the best account, it is proposed to give a series of papers descriptive of visits actually paid to such places as seem particularly suitable for the purpose. In these papers the set form of notes of object lessons will not be adopted. The writer will rather seek to give a straightforward account of the noteworthy objects seen during the visits, with such incidental observations as may guide and develop thought on the part of the pupils. Difficulties arising from distance or other circumstances may sometimes make it impracticable to take a class of boys or girls to some of the places described. But if the visit be paid with only one or two for companions, or even by the narrator altogether unattended, it is believed that the information included in an account of it may be interesting, useful, and suggestive to the teachers who may read it.

Amongst the places of interest which may possibly be visited, none are likely to prove more attractive and more instructive than factories where live workmen are doing real work, provided the work is of such a kind as can be understood by an intelligent spectator. And it is with extreme pleasure that we present for the opening of this series of papers an account of a visit to

MESSRS. DOULTON AND CO.'S LAMBETH POTTERY WORKS.

We were fortunate in being able to secure permission to visit these interesting works, and, as an exceptional privilege, to take a small party of eight or ten boys. The ordinary conditions under which the work must be carried on constitute an obvious reason why the party of visitors must be limited to a small number, and also why the privilege must be exceptional. As Messrs. Doulton, in kindly allowing us to accompany a party over their factory, pointed out how imperative it was to make such permission exceptional, we feel bound to guard ourselves against any appearance of encouraging other teachers to suppose that admission would be readily granted to any who may apply.

Starting, then, from North London, our party of ten in all mounted an omnibus at King's Cross, and sped along Gray's Inn Road, Chancery Lane, and the Strand, and on over Waterloo Bridge. And as most of the boys had seen but little of our great London, opportunity was taken to call attention to the quaint buildings of Staple Inn, to the new Record Office, the Law Courts, Somerset House, and other objects of interest. From Waterloo Road we walked to Lambeth, and had good views of Westminster Bridge, of the Houses of Parliament, of St. Thomas's Hospital, of the Thames, and of Lambeth Palace. To see and to talk about such places as these is, we believe, no slight advantage to boys whose lives are passed in narrowing and depressing circumstances. At length we arrive at the imposing range of buildings where Messrs. Doulton and Co. carry on their extensive manufacture of pottery of various kinds, from drain pipes and gingerbeer bottles to vases and terra cotta ornaments of most artistic design.

Entering the show-rooms, we have before us a large assortment of beautiful specimens of Art Pottery; but the object of our visit is understood to be an inspection of the processes of manufacture, and, accordingly, we are taken to the office of Mr. Rix, one of the managers, and he soon places us in charge of Mr. Gibson, a kind, intelligent, and expert guide, who conducts us to the top floor of the factory.

Here we may note some of the interesting remarks which occurred in a preliminary conversation with Mr. Rix. The manufacture of pottery had commended itself to us as suitable for one of these visiting lessons on the ground to which

reference has already been made. The processes, or the most essential of them, can be followed and understood by any intelligent observer. There is no mysterious rush and no bewildering noise and apparent confusion such as characterises many of the more mechanical manufactures. Mr. Rix suggested another noteworthy feature. The value of the finished product is almost entirely the result of the thought, the skill, and the taste of the workman. The intrinsic worth of the raw material—clay—is almost nothing; the worth of an art vase, owing entirely to the beauty of its design and the perfection of the workmanship, may be enormous. The mind of man and the effect of the fire, which is another essential element in the production, combine to multiply the value of the lump of clay almost infinitely.

The processes through which the clay passes for some forms of pottery are very numerous, as many as thirty or forty. For our purpose a selection of the most important must suffice. The clay used here is brought, we are told, from Devonshire. It comes up the Thames in barges, of which we may see some in the river opposite the works. In the same way coal is brought for the firing. Many thousands of tons of each of these minerals are used here annually.

The first process is the purifying of the clay. This we do not see, but it is described by our guide. The clay is ground and washed repeatedly, so as to be cleared of all impurities. It is also treated with magnets to take out every particle of iron, which would spoil the pottery. Then the clay is kneaded and slapped a great deal to drive out all air-bubbles. Next it is brought to the *thrower*, and it is to his work we are first introduced.

FIG. 1.—The Potter's Wheel. Preparing Clay and Throwing.

The thrower sits before a revolving disc or table, which receives its horizontal motion by means of strap-gearing which connects it with a wheel moved by steam power and revolving vertically. A piece of clay of the size needed is placed on the disc, and then while it is revolving it is worked up by the thrower's hands into an upright column of conical shape; then it is depressed and hollowed out by the thumb and fingers. The skilful workman can in this way rapidly mould the clay into vases, cups, or jars of an endless variety of forms. While we look, he uses the same piece of clay to make in succession a broad vase, a slender upright one, an Oriental bottle, a dessert plate, and a strawberry dish. By a deft use of the fingers he indents or scollops the edge of the vessel, makes by intermittent pressure of the fingers an edge like leaves intertwined, and forms a 'toby' jug with lip or spout. With a piece of stretched wire he cuts off the upper part of the clay and makes some smaller article with the remaining part.

While here we learn that the only material used for the goods made at the great factory is the Devonshire clay. China, which is made at Messrs Doulton's Works at Burslem in Staffordshire, required a mixture of materials, and there are considerable differences in the mode of manufacture, the ornamentation, the glazing, and the firing.

Leaving Mr. Askew, the expert workman who has done so much to demonstrate the possibilities of the potter's wheel and the hand of man in moulding the plastic clay into a great variety of forms, we proceed to parts of the works where individual workmen are engaged in making large numbers of articles of similar pattern. During an interval, while the machinery is stopped for the purpose of oiling its parts and examining the gearing, we watch two workers employed at a potter's wheel turned by hand. One turns the vertical wheel, while another, the thrower, manipulates a large mass of clay on the disc to form a tall jar or vase of a pattern something like the ancient amphora, or water jar. This work requires on the part of both workmen a considerable amount of muscular exertion, and the clay must be worked up with great care to preserve the exact upright position, and to make the sides of uniform thickness.

Then we are taken to see workmen making stoneware bottles for ginger-beer, blacking, and ink. A boy cuts and weighs out for each article a piece of the prepared clay, which he passes on to the thrower, who moulds it in the manner previously described. From time to time he dips his hands in a vessel of water to keep the clay of the necessary degree of plasticity. Each article as moulded is placed on a board, or tray, and the tray when full is carried off on a boy's head, or, in the case of heavy goods, on a small truck, and placed on shelves to set and harden.

Before they become quite hard, however, they are taken to the turner. This workman has a lathe similar to that used for turning wood; and having placed the vase, jar, or jug in position, and set the lathe in motion, he uses a kind of scraper, or chisel, to render the surface perfectly smooth and regular. This process is used also to reduce the thickness and weight of the vessel. It is very curious to see thick shavings of clay thus turned off. All the shavings and fragments are of course collected and used again mixed with other clay; for no waste of material is allowed.

Such things as spouts and handles to jugs are separately moulded, and then stuck on by special workmen. We saw one fastening spouts on earthenware tea-pots. The process was very simple. With a kind of stiletto he pierced a number of holes for the passage of the tea into the spout. Then taking up the spout, and moistening the parts to be joined with a small brush dipped in water, he carefully pressed them together, and this stage of the manufacture was complete. When the shaping and joining is finished, the vessels are further dried before being fired.

But before we proceed to the lower floors where the later stages of the manufacture are carried on, we have a special treat in being taken to the studio of Mr. George Tinworth, the celebrated artist in clay sculpture. We find him a kindly unassuming man, dressed in his workmanlike linen blouse, and busy with some new panels which are intended to form part of a series illustrative of the life of Moses. One, which is very nearly completed, represents in high relief the mother of Moses making the ark of bulrushes. In the centre of a room in an Eastern dwelling Miriam sits on a stool, nursing the infant Moses. Near her sits the mother engaged in weaving the bulrushes to make a rude sort of cradle-boat. Aaron, seemingly a boy of about four years, stands by the wall looking on, and the father is just going out at the door. The relief picture is a vivid representation of the famous incident of Bible story. Another panel shows Moses interfering with the Hebrews quarrelling; and another, the host of Pharaoh being overwhelmed by the waves of the Red Sea. There is a very large panel in a less advanced stage, but very boldly sketched out, and this represents the people of Israel being led forward by Moses. It gives promise of being, when completed, a truly remarkable work of art. The series, Mr. Tinworth remarks, is intended for an exhibition to be held on the Albert Embankment in the coming summer.

Most of Mr. Tinworth's works are representations of Biblical scenes, and his devout and fruitful genius bids fair to compile what has been spoken of as 'a Bible in terra cotta.' Some of his most striking achievements are to be seen in his beautiful panels representing scenes in the life and passion of our Lord, but all these have left the studio, and become widely known through photographs and other reproductions. Looking round the studio we see, amongst other artistic properties, an actual bulrush cradle, which has evidently served as model for the last completed panel briefly described already. Mr. Tinworth is a man of playful humour as well as a serious artist, and the members of our party are delighted with some small humourous groups of animals in terra cotta. One represents a 'tug-of-war' between three frogs and three mice. Another consists of a mouse acting as schoolmaster to the young mice, and another called 'Cockneys at the Seaside,' is a representation of three foxes sea-sick in a boat, with a frog at the helm. It may be imagined how intensely these little works amused our juveniles.

It ought to be said that Mr. Tinworth's works are not subject to the glazing process which is applied to most of the vessels for domestic use. They are examples of fine art—works of sculpture in *terra cotta*, a term made from the two Italian words, which mean simply 'baked earth.' With hearty thanks we bid good-bye to Mr. Tinworth, and proceed to another studio, that of Mr. Butler, who creates the coloured designs which adorn the surface of the famous art vases of Doulton ware.

Here in glazed cabinets, on shelves and on tables, we see a great variety of vases in different stages of ornamentation. Those in the cabinets are awaiting completion, and are kept standing on wooden shelves saturated with water to keep them moist, or in the state called *green*-dry. The artist, after pencilling a design on the surface of a vase, works on it with a tool like an etcher's needle, and so forms an embossed or incised pattern. Some of the designs are floral, some humoristic treatment of the sun and moon, but all differ; so that one who buys a pair of these vases may be sure that no one else has a pair like them. The colours are also laid on here. They consist of different metallic oxides; but as the colours are entirely changed by the action of the fire, we are not able to form, from the unfired specimens, a correct idea of the appearance of the vases when they have passed through the furnace. We only know from what we have seen the colours are often wonderfully rich and effective. After the form is finally given by the completion of the artist's design, the vases are allowed to stand in the air till they become what is called *white*-dry.

FIG. 2.—Vase in Figured Pottery.

Before proceeding to the kilns, we are shown three other interesting processes. The first is the printing of names on stoneware bottles, such as are used for ginger-beer. Here, again, each stage is easy to observe and follow. A small copper plate has the inscription etched on its surface. A roller passed over a slab covered with ink is rolled over the copper-plate, so as to fill up the channelled letters. A boy wipes off the superfluous ink, and then a sheet of thin damped paper is laid on the plate, and the two together are passed under a small press. The printed paper is then wrapped round the bottle, the porous surface of which soon absorbs enough of the ink to make a clear impression of the trade mark or inscription.

On one of the lower floors we see the manufacture of the stoneware sinks which are so largely superseding the use of those made of stone. The sinks are moulded in the following manner:—A large rectangular slab is placed on the floor. Four stout pieces of wood forming sides and ends of a frame are fitted together so as to leave a channel round the slab. This channel is filled up with clay, which is dashed in and beaten down, so as to secure its being free from air-bubbles. If these were present when the ware is fired, they would be likely to cause flaws, and possibly the complete destruction of the work. A layer of clay is placed on the top and levelled to a uniform thickness. When the moulded clay has had time to dry, the sides of the frame are taken away, and we have the complete sink, inverted, ready for the furnace.

The last of the shaping processes we saw was the making of drain-pipes, straight and curved. The clay is taken into a sort of chamber overhead, called a steam-box, and is then, by means of a machine set in motion and regulated by a lever, forced down through a ring-shaped opening, that is, an opening whose section consists of two concentric rings. The pipe of moist clay thus formed is received by a workman standing below. If a straight piece is required it is allowed to go straight down, and cut off by a stretched wire when it is of the proper length. If a bend is wanted, the workman who receives it bends it gradually to the shape needed, until the wire again divides it from the clay above. The flanges or thickened edges are made separately and put on afterwards. We are told that this factory turns out 30 miles of drain-pipes per week.

FIG. 3.—Making Pipe Bends.

Now we come to the kilns. These are built up of bricks and clay 'gearing.' The gearing is made of a sort of coarse stoneware, made into slabs and cases to be used for ranging the articles on shelves round the inside of the kiln. Articles of all sorts are placed in the same kiln; but the coarser and commoner sorts are placed on the top shelves, and in parts of the kiln which are less safe from damage by accident. The most valuable sorts are placed on the floor of the kiln near the centre. When the kiln is full, the fires are lighted and the sides closely built up. The heat is kept up from 18 to 36 hours, according to the size of the kiln and other circumstances. The degree of heat then reached is above what is called white heat. At this point the important process of glazing, which renders the surface non-porous, is accomplished; and it is done in the following peculiar manner. A quantity of common salt—chloride of sodium—is thrown into the furnace. The intense heat with the moisture in the kiln decomposes the salt, which diffuses itself in fumes throughout the chamber. Hydrochloric acid is given off, and the oxide of sodium or soda thus resulting from the salt is deposited on the surface of all the

ware, and, becoming fused with a thin outer layer of the clay, forms an alkaline silicate or glaze. This process is known as salt-glazing, and is of great importance, because it renders any second firing process unnecessary. In the china manufacture, the ware, after being once fired, is dipped in a mixture called glaze, and then has to be fired again. As soon as the salt has been thrown into the flames, the kiln has to be built up closely and made air-tight; for if any cold air from outside passed in through a small hole it might cause the ware to crack and fly, and so do damage to the possible extent of hundreds of pounds. After this sealing of the kiln the fires are allowed to go out, and the time required for cooling is from three to four days, at the end of which time the kiln is drawn, that is, the outer case is pulled down, and the contents are carefully taken out, sorted, and stacked ready for sending away to customers or to warehouses and show-rooms.

Fig. 4.—Drawing a Kiln.

The close of our visit brought us well into the dinner-hour, but for the sake of variety we returned by another route, crossing Lambeth Suspension Bridge, and walking to Palace Yard, where we had a comprehensive view of the Houses of Parliament, glanced at the equestrian statue of Richard Cœur de Lion, and marked the changes about Westminster Abbey. We entered the latter building, and had a hasty look at Poet's Corner, noticed in the Nave the tombs of distinguished men, and the busts of Arnold, Kingsley, Maurice, and Keble, at the west end. Then we passed the Government offices, watched the changing guard at the Horse Guards, crossed the parade ground in St. James's Park to the Duke of York's Column, and so to Piccadilly, where we took an omnibus that carried us schoolwards.

Arrived at school, the boys were set to write about their visit while the impressions were fresh in their memory; and the collation of their accounts with subsequent questions, has proved of service in the preparation of this paper, which in turn may, we trust, prove of service to our readers. In closing we desire to put on record our sincere thanks to Messrs. Doulton & Co. for their permission to pay this interesting visit, and for their further kindness in the loan of the picture blocks for our illustrations, and also to their managers, artists, foremen and workmen, for the readiness with which they gave all necessary information, and the anxiety they showed to make the visit agreeable and profitable.

FULL NOTES OF A LESSON ON THE FROG.

(See Supplement presented with this Number.)

BY WILLIAM DONE, B.A.,

Head-Master of the Brighton Pupil Teacher School.

Class—Standard VI. or VII. *Time*—40 minutes.

N.B.—'Circular 369' advises the Frog to be taken under the following heads:—'Frog (compare with Toad and Newt).—Movement, capture of prey, breathing, winter quarters.' The accompanying picture and diagrams illustrate these points, and also somewhat of the frog's life history. Of course, the matter of the lesson must be modified to suit the capacity of the class.

Articles of Illustration.—In addition to the picture and diagrams, being spring-time, one might get frog spawn from a pond, and also tadpoles, and put them in a glass globe.

Heads.	Matter and Method.
I. — Preliminary questioning eliciting some of the most prominent characteristics of the frog, toad, and newt.	Show the pictures of frog, toad, and newt. Country boys and girls will probably call the last an '*eft*.' Perhaps they will call the toad a frog. Make them notice these two closely. Both have broad, short, squat bodies, big heads, and no tails. The colour of both is not unlike. But look at the feet on the hind legs. In the toad they are fully webbed, in the frog partially so. The toad's body seems covered with warts, it rests in a different attitude to the frog, and has a more unprepossessing appearance. The Newt or Eft has a tail, and as country boys will know, it lives almost entirely in the water.
II. — How the frog gets about:—	On questioning the class we may find out that the children have seen frogs and toads on the land and in the water. Also they will answer that on the land the frog gets along by jumping.
(1) Its long legs show it to be a jumping reptile.	Call attention to the great length of its hind legs, and compare such jumping animals as kangaroo, hare, etc.
(2) Its webbed feet show it to be adapted to swimming.	How about the webbed feet? What other creatures do we know with similar webs between their toes? Then such feet are admirably adapted for swimming. Compare the way a frog swims and the way a man swims. The frog makes less use of his front legs than we do of our hands. We see from the picture the newt is not adapted for thus living on land.
III.—How it captures its prey. (Diagram 8.)	Frogs and toads feed on flies and other insects, worms, slugs, etc. Look carefully at diagram 8, showing the tongue of the frog.
Its peculiar tongue adapted for catching insects.	How does it look different from our tongue? First, it is fastened to the front of the mouth and not to the back, so it can project forward a great way. Secondly, we see it is notched at the end, or forked as we call it. Thirdly, what you cannot see, the tongue is sticky. With its bright eyes the frog watches for any insect that may come within reach of its tongue, and then like a dart it is shot out and then in again, with the poor insect stuck on to it.
It does not chew its food.	The frog does not chew his food but swallows it whole, like fishes do. The Newt seizes its prey with its jaws, not with its tongue.
IV.—How it breathes. (Diagram 1.)	If one has noticed a frog in the water, it keeps on coming to the surface, apparently to breathe, like we should do. If you look at a frog or toad when on land it always seems to be swallowing, when there is apparently nothing to swallow.

Heads.	Matter and Method.
The frog has no ribs.	Now, see the skeleton of the frog. What is apparently wrong with it? There are no ribs. It cannot, therefore, move its chest and inflate its lungs as we do. It has to take air into its mouth and force it into the lungs by closing the mouth and nostrils, and contracting the back of its mouth as in the act of swallowing. The newt also breathes atmospheric air.
V.—Winter quarters. (Diagram 2.)	The children may know that they do not see frogs about in the winter. For one thing, their food supply is largely cut off; the ponds may be frozen, and so, as it is so extremely uncomfortable for the frog to live, Nature has kindly adapted it to sleep the winter away, carefully hidden under some stone or down some nice hole.
VI.—Life history of the frog:— (Diagrams 3, 4, 5, 6, 7.) (1) Frog spawn. An egg with a jelly-like covering.	Perhaps the teacher can get some frog spawn. It is a mass of black eggs, each surrounded by transparent jelly. These eggs are as small as pin's heads. We see them very much magnified in diagram 3. Though originally deposited at the bottom of the water, the inflated jelly-like covering causes them to come to the top, but at the same time prevents them being eaten up by fishes or birds, as it causes them to slip away when touched. The warmth of the spring sunshine hatches them into tadpoles.
(2) Tadpoles.	If live tadpoles are procurable, call attention to the shape. It is apparently all head and tail at first. Tadpoles, too, breathe like fishes, by gills (see diagram 5), and of course could not live out of water. As the tadpole grows older its tail gets shorter, and also its gills get smaller, and gradually lungs begin to form inside, and limbs to grow underneath its skin. Diagram 6 shows at this stage it has a pair of hind legs, and that its gills are very much smaller. It begins to breathe atmospheric air when it pokes its head out of the water, but, on the whole, still prefers its life as a water dweller. Diagram 7 shows the tail very short; and finally the gills disappear, the tail vanishes, and a pair of front legs come out. Other changes have also been going on inside, and it is at last a complete reptile.

OUR PRIZE COMPETITION COLUMN.

FRENCH.

Prize Editor.—J. J. BEUZEMAKER, B.A.,
Examiner in French to the College of Preceptors.

PRIZE AWARDS—MAY.

The Prize is awarded to *Herr Kaufmann*, the pseudonym of JESSIE A. NORRIE, Newport Public School, Fifeshire.

First Class.—Hopeful, Crossbeian, Chérie, Kent, Au revoir, Herr Kaufmann, Mater, Stet.

Second Class.—Françoise, Ecila, Erica Tetralix, Edythe, Humber, La deuxième année, Livonia, Calcaria, Aurora Leigh, Semper idem, Euelpis, Jackdaw, Floreat Etona, Mignon, Forest, Canis, Jubilarian, Toga-pons, Hypatia, Nemo, Oulton, Nortoniensis, A Lover of France, One and All, Eric.

Third Class.—Caledonia, Robin, A L.L.A., Daffodil, C.G.B., Immortelle, Agricola, Rodmure, Perseverantia, P.C.Q., Destournelles, S., M. van Houtte, X., Crimora, Samflot, Nell, Mab, Periwinkle, Une ganache, Phrost, Tanganyika, Purple Pansy, Nancy, Florimel.

'Il est incontestable que beaucoup de contrastes sont risibles. Dans une parodie, l'effet comique est produit par le contraste entre la gravité de l'œuvre originale et l'irrévérence du travestissement. Dans une naïveté d'enfant, ce qui nous fait rire, c'est le contraste entre la portée du mot et la candeur de celui qui le dit. Certaines transpositions font rire pour une raison analogue: une tragédie traduite en style trivial, une aventure cornélienne caricaturée en scène bourgeoise, les sentiments sublimes exprimés en argot parisien, l'héroïsme sur le ton pot-au-feu; certaines conférences de M. Sarcey sont, à ce point de vue, d'un comique irrésistible. Le clown qui s'élance, grisé d'enthousiasme, pour imiter l'écuyère, et qui s'aplatit lourdement sur le sol, cause le rire en provoquant une impression forte et grosière de contraste.

Mais il y a beaucoup de contrastes qui n'ont rien de risible. Le *couac* d'un chanteur, dans la plupart des cas, est tout simplement pénible: c'est pourtant un effet de contraste. Au lieu du clown, si c'est l'écuyère elle-même qui tombe, le contraste entre sa chute et sa voltige de tout à l'heure est très net: portant aucune envie de rire. Un mot qui, en lui-même, serait plaisant, précisément s'il est prononcé dans des circonstances solennelles avec lesquelles il fait contraste, cesse de l'être: rien d'insupportable comme un compagnon facétieux quand on est recueilli dans l'admiration ou dans la tristesse. Tout ce qui détonne fait contraste, et pourtant ne fait pas rire.—CAMILLE MÉLINAND.

Translation by *Herr Kaufmann*.

That many contrasts are laughable is beyond dispute. In parodies the comic effect is produced by the contrast between the serious character of the original and the want of reverence in burlesque. In the quaint sayings of children, what we laugh at is the contrast between the significance of the speech and the simplicity of the child who utters it. Certain transpositions provoke laughter from analogous reasons: for instance, a tragedy written in the style of a farce; a knightly exploit caricatured in fustian; noble sentiments expressed in Cockney slang, and heroism in the language of Billingsgate: some of M. Sarcey's lectures are from this point of view irresistibly funny. The clown, carried away by enthusiasm, springing up to imitate the circus-rider, and falling heavily to the ground, raises a laugh by the rude force of the contrast presented.

But there are many contrasts not at all laughable. The sound produced when the voice of the singer breaks, is rarely anything but painful: and yet that is a contrast. If, instead of the clown, it is the circus-rider herself who falls, the contrast between her fall and her flying leap of a moment before is striking; yet we have no desire to laugh. A speech which would be amusing in itself, fails in its effect when uttered under circumstances of contrasting solemnity: nothing is so unbearable as a companion who persists in being jocular when we are wrapped in admiration or sorrow. Every discord is a contrast, but discord is not laughable.

The extract was a test in rendering hard words and phrases. The style presented very few difficulties. The following were the chief stumbling-blocks:—*Une naïveté d'enfant* is a naïve saying, not 'the artlessness' as some had rendered it. *Les jeunes personnes sont sujettes à dire des naïvetés.—La portée du mot*, the full meaning of the saying. *Un mot* is any saying remarkable for thought, wit, or felicity of expression. *Un mot excellent, un mot spirituel, un mot heureux.—Une aventure cornélienne*, an adventure told in the grand style (of Corneille).—*L'heroïsme sur le ton pot-au-feu*, had given much trouble. Heroism in a kitchen style, in a pot-house style, in a milk-and-water tone, with respect to soup-making, in a hand-grenade system, with the hand-grenade, were some of the mistranslations. (*Pot à feu et à grenade* is a grenade used in sieges. This is an instance of the misuse of dictionaries, and that of bad ones.) *Fireside heroism* is the best rendering.—*Conférence* is lecture, discourse.—Le *couac* d'un chanteur. *Couac* is a popular word for the sudden crack in the voice.

The prize-winner's translation is good on the whole and happy in several renderings, but it is less epigrammatic than the original, and it suffers from exaggeration. *La gravité de l'œuvre originale et l'irrévérence du travestissement*, the gravity of the original and the levity of the travesty, is preferable to the prize-winner's rendering. *Une naïveté d'enfant.* The word *naïve* is used in English. *Quaint* does not convey its meaning exactly. The renderings of *style trivial*, by the 'style of a farce,' of *le ton pot-au-feu*, by the language of Billingsgate, are instances of over-pointing. 'The sound produced when the voice of the singer breaks,' is correct, but weak. 'The sudden crack in a singer's voice' would have sufficed. *Every* should have been repeated in the last sentence: 'but every discord is not laughable.'

EXTRA PRIZE AWARD.

The prize is awarded to *Mater*, the pseudonym of DELIA NORMOYLE, The Convent, Highgate Road, London, N.W.

1. Give a sentence containing *mode* (m.) and *mode* (f.).
   La mode régle tout, même le mode d'enseignement.

2. Translate into English :—Rêver, c'est s'équiper en chasse et partir pour penser, quitte à revenir bredouille.
   To dream is to equip oneself for the chase and start in order to think, with every chance of returning with an empty bag.

3. Translate into French :—The excesses of our youth are drafts upon our old age, payable with interest about twenty years after date.
   Les excès de la jeunesse sont des traites tirées sur l'âge avancé qu'on paie avec les intérêts à environ vingt ans de date.

4. Correct :—Ramenez vos amis jusqu'à la dernière porte. C'est trop rude de les donner congé au sommet de l'escalier.
   Reconduisez vos amis jusqu'à la dernière porte. C'est trop grossier de leur donner congé au haut de l'escalier.

5. Who wrote :—*J'ai vi, me voilà désarmé ;* and where ?
   Piron, in *La Métromanie*, Act iii., Scene 7.

MAY PRIZE COMPETITIONS.

A Prize of One Guinea will be given for the best translation into English of the following extract :—

La postérité garde son bien tant qu'elle peut ; mais, a chaque période qui lui amène le flux d'une multitude de richesses, elle en sacrifie une partie équivalente sous peine de voir craquer son coffre-fort. Elle fait sans doute son choix à bon escient, conserve les meilleures choses, cencentre, élague, résume, modifie avec une complaisance indéniable ; mais enfin elle jette le reste à la mer. Ce reste, d'ailleurs, n'est pas tout à fait perdu : la curiosité et l'érudition recueillent parfois des parcelles de ces biens détaillés, y trouvent des perles dédaignées par mégarde, et il arrive même souvent qu'avec ces épaves un homme de génie refait une valeur de premier ordre qui sera restituée au trésor commun sous une forme nouvelle. Jusque-là, la postérité, c'est-à-dire l'ensemble d'une civilisation et d'une société, qui, avant tout, veut vivre dans les conditions normales de la nature humaine, poursuit son chemin, ne s'occupe plus du tout de ce qu'elle a repoussé, et, satisfaite à bon droit de ce qu'elle garde, soit définitivement, soit à titre provisoire, attend patiemment l'invasion d'éléments ultérieurs, lesquels l'obligeront à de nouveaux sacrifices.—COMTE CHARLES DE MOÜY.

EXTRA PRIZE.

A Prize of Half-a-Guinea will be given for the best set of answers to the following :—

1. Correct the following and account for the corrections :—
   Croyez-vous qu'il est parti ?
   C'est facilè d'apprendre ce métier.
   Il demeure en Amérique du Nord.

2. Translate into French :—
   That is acting as a friend.
   Take care you do not return in the evening.
   I was afraid he would leave to-morrow.

3. Give the English for :—
   Son affaire est faite. C'est affaire à vous. J'ai votre affaire. J'en fais mon affaire. J'ai affaire avec lui. Les affaires vont mal. J'ai bien affaire de tout cela ! Il aura affaire à moi.
   Il a bon air. Il a l'air bon. Toute la ville est en l'air. Il est toujours en l'air.
   J'ai touché de l'argent ce mois-ci. Il a bien placé son argent. Mon ami est brouillé avec l'argent.

4. Translate :—*Il en est de lui comme de l'âne de Buridan*, and explain the allusion.

RULES.

1. All translations should be posted not later than May 11, and addressed :—*Prize Editor*, Office of THE PRACTICAL TEACHER, 33, Paternoster Row, London, E.C.
2. Competitors should cut out, and send the Coupon which appears on the Back Wrapper page of the current number.
3. Competitors should adopt a pseudonym, and send name and address written on a separate piece of paper.
4. Teachers employed exclusively in teaching modern languages are not eligible as prize-winners.

PUBLICATIONS RECEIVED DURING APRIL.

THE AMERICAN BOOK COMPANY.

An Introduction to the Study of American Literature. (Brander Matthews.)
Selections from Viri Romae. (Arrowsmith & Knapp.)
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PRACTICAL CHEMISTRY NOTES.

BY THOMAS CARTWRIGHT, B.A., B.SC. (LOND.),

First Class Honoursman in Practical Chemistry (Science and Art Department), Lecturer in Chemistry (Practical and Theoretical) to the Middlesex County Council, Author of 'Conversational Lessons in Chemistry.'

(*a*) ELEMENTARY.

ONE of the tests to be set at the forthcoming examination in the elementary stage of Xp. will, we learn on good authority, be as follows:—Fit up the apparatus for the preparation of, say, CO_2; take a weighed portion (say 5 grams) of marble, pour the solution which remains, after all the marble has disappeared, into an evaporating dish; evaporate to dryness and then weigh the resulting body. This is the form that the preparation of bodies is most likely to assume, it will, therefore, be wise to get ready for it.

Atomic Theory.—A correspondent writes that he has great difficulty in getting his junior pupils to understand this. The best way of dealing with this is to make perfectly clear the position of Dalton when he put forward his famous theory: the laws of constant and of variable proportion were known, and the difficulty was to account for these. To explain them was the aim of Dalton when he put forward his theory that (1) matter is atomic; (2) chemical action is atomic action; (3) all atoms of the same element are alike in weight and in properties, so that any one is a fair sample of all. If, then, chemical action is between atoms, and these have a fixed and unvarying relative weight, we have a reasonable explanation of the laws of constant and multiple proportions, which was just what Dalton wanted.

(*b*) ADVANCED AND HONOURS.

Last month we gave a brief mention of the recent work of Prof. Tilden on phosphoric anhydride. To-day we are able, thanks to the 'Journal of the Chemical Society,' to give a full account of the methods employed by the Professor and his co-workers in arriving at their conclusions. We need hardly dwell on the importance of this work to students of the Science and Art Department.

THE MOLECULAR WEIGHT AND FORMULA OF PHOSPHORIC ANHYDRIDE AND OF METAPHOSPHORIC ACID.

BY DR. TILDEN AND R. BARNETT, B.SC.

From the 'Journal of the Chemical Society.'

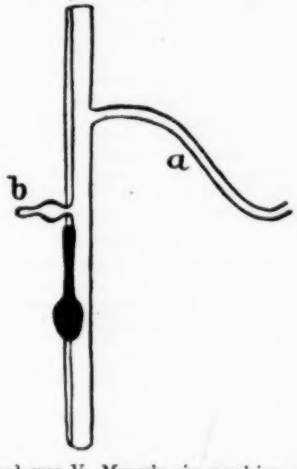
Phosphoric Anhydride.

Considerable advances have been made within recent years in the study of the compounds of the elements of the P group, and among the results established may be remarked especially the fact that the oxides generally, and several of the sulphides, conform to the type of the elements themselves, *i.e.* contain four atoms of P, As, or Sb. The formulæ As_4O_6 and Sb_4O_6 have been established, for arsenious and antimonious oxides respectively, by the vapour density determinations of V. and C. Meyer. The formulæ P_4O_6 and $P_4O_6S_4$ have in like manner been settled by Thorpe and Tutton, and the low sulphide has the corresponding formula P_4S_6 calculated from its vapour density by Isambert. The compound described by Thorpe and Tutton under the name of phosphorus tetroxide is regarded by them as having the molecular formula P_2O_4, and hence, as the analogue of nitrogen tertroxide, but the determination of the vapour density has not yet been attempted.

Phosphoric anhydride alone remains unexamined among the compounds of P which are volatile without dissociation; but it is usually still expressed as pentoxide—P_2O_5—from analogy with the sulphide, the vapour density of which has been determined by V. and C. Meyer. According to Shenstone and Beck, phosphoric anhydride usually contains lower oxides of P; for the preparation of the pure oxide we have therfore adopted their process with slight modifications. The sublimed product, after passing together with dry O through the heated Pt sponge, was collected in a narrow tube of hard glass, united by means of the blow-pipe to the end of the combustion tube. When full this tube was drawn off at its junction with the combustion tube exhausted by the Sprengal pump, and sealed. Separate minute portions could then be sealed off for successive experiments.

The oxide thus obtained was chiefly in the form of a crystalline crust adherent to the glass, but also partly in a loosely flocculent condition. When free from phosphoric acid, it does not melt on the application of heat, but sublimes rapidly below a red heat. An attempt was made to melt the oxide in a tube attached to an apparatus in which it could be exposed to a pressure of nearly three atmospheres. On applying the flame of a spirit lamp, however, the substance sublimed without melting.

In order to determine the vapour density of this substance, it is necessary, on account of its exceedingly hygroscopic nature, to avoid contact with ordinary undried air. Pt is the only available substance capable of resisting to a sufficient extent its action at a red heat, though even Pt is liable to be corroded, especially in the presence of O. Hence peculiar difficulties stand in the way of exact determinations of the density of the vapour of phosphoric anhydride, and the results of our earlier experiments were unsatisfactory owing to various causes which it is unnecessary to describe here.



The method used was V. Meyer's air expulsion process. The apparatus consisted of a cylindrical Pt bottle 10 cm. high and 6 cm. diameter, holding about 300 cc. and having a tubular neck 40 cm. long by 1½ cm. internal diameter. Into the end of this Pt tube was fitted a glass tube with two branches; one, a narrow bore gas-leading tube *a*, the other a short straight tube *b*, which could be closed by a stopper. The top of the glass tube was closed by a rubber stopper traversed by a perforation through which passed, gas-tight, a glass rod having a mark on it, so that it could always be pushed in

to the same extent. The small tube containing the substance could be inserted into the rubber stopper from below, and would be held in the perforation until pushed out by the glass rod. The source of heat was a gas furnace in which the Pt bottle could stand upright. It was found necessary to protect the Pt from contact with the furnace gases, and accordingly we procured some fireclay cylinders closed at one end, into which the bottle would just slide, and with this covering it was placed in the furnace. The top of the cylinder projecting into the air was packed with asbestos card, so as to prevent cooling by convection. The expelled air was at first collected over H_2SO_4, but as this was inconvenient, it was replaced later on by kerosene of known density and vapour pressure. In order to fill the bottle with dry air, a long tube passed through the rubber stopper to near the bottom of the bottle. As the end of this tube when wholly of glass was found to collapse when hot, about 30 cm. of the lower end was replaced by a tube of Pt foil. Bulbs filled with H_2SO_4 and NO_3 were connected with the side branch, and thus a current of dried air entered here, passed down into the bottle, and escaped up the long tube. This operation was performed after the Pt bottle had been heated to the requisite temperature and all was ready for the experiment. By making use of the same side branch and long tube at the end of the experiment, the vapour could be expelled and the apparatus left ready for a second operation.

The following are some of the results obtained :—

Weight of Phosphoric Anhydride Acid.	Volume of Air.	Vapour and Density.	Molecular Weight.
·2055 grams	14·02 N.T.C. c.c.	163	326
·1904 ,,	13·83 ,, ,,	153·6	307
·2600 ,,	18·22 ,, ,,	163	326
·1859 ,,	12·38 ,, ,,	167·5	335

Calculated molecular weight of $P_2O_5 = 142$ }
$P_4O_{10} = 284$ }

It seems remarkable that while the four atoms of P remain associated in this compound, and in the oxy-sulphide, $P_4O_6S_4$, discovered by Thorpe and Tutton, the molecule should divide, when the whole of the O is replaced by S, giving the pentosulphide P_2S_5. It is noticeable, also, the lower sulphide is represented by P_4S_6 on the evidence of vapour density. Now supposing the molecular constitution of the higher sulphide to be P_4S_{10}, and that on vaporisation it dissociates into P_2S_5 and S_6, the vapour density would have the value (7·67) found by V. and C. Meyer. The boiling point of the so-called pentasulphide is 530°, and Meyer determined the vapour density at a temperature described as dark red. A very low red heat, as shown by fireclay bricks, = 700°. The density of S vapour at 606° was found by Blitz, as by Dumas's process, to be 4·734; and from estimation through a range of low temperatures, it was found steadily to diminish from 7·937 at 467·9°. It may fairly be supposed, therefore, that the density of the S vapour at, say, 650°, assuming this as the temperature of the bath in Meyer's experiments on P_2S_5, would be somewhat less than 4·7. Assume the density to have been 4·5, then equal volumes of such vapour and the vapour of P_4S_6 would give a mixture having the mean density of 7·7. The vapour of phosphoric sulphide is brownish-yellow, and, though paler, is similar in colour to S vapour. Altogether the proof that the highest sulphide of P is a pentasulphide is far from complete, and certainly the density of its vapour cannot be accepted as evidence bearing on the case of the corresponding oxide.

Metaphosphoric Acid.

This acid was prepared by dissolving commercial P_2O_5 in HNO_3, evaporating the solution in a Pt dish until the liquid ceased to evolve bubbles of vapour, and then boiling say about half of it in a Pt crucible into that redness. Examples of the residue were then gently taken out by means of a little Pt dipper, dropped into a small tube of Pt foil, and immediately encased in a thin tube, which was sealed up and weighed. Two determinations taken at a bright red heat gave the following results :—

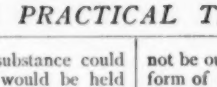
		Calculated from		
I.	II.	HPO_3	H_2	H_4
76·8	78·2	40	80	160

It is obvious from these experiments that although the composition of metaphosphoric acid varies a little, the vapour of this substance consists chiefly of a dilute acid, $H_2P_2O_6$, which is apparently liable to undergo partial dissociation at a high temperature, and even during ebullition to part with a small quantity of H_2O.

Constitution.

It is perhaps idle to speculate as to the possible constitution of compounds such as the oxides and acids of P, but a few words will not be out of place. The group of four atoms of P is a very stable form of structure, inasmuch as it bears very high furnace temperature without breaking up.

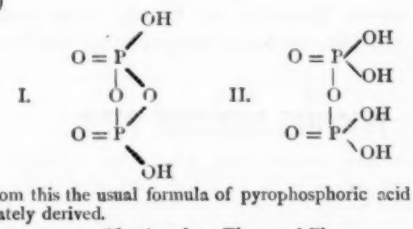
The molecule of P being represented as—



it is obvious that there are but twelve units of displaceable valency. This can only provide for the accession of six atoms of O, unless we assume either the linkage of O to O in a chain, or the disruption of the bond between the P. The former is so improbable, that we are reduced to the latter.

On the introduction of water, the molecule of phosphoric acid is divided into two parts, and metaphosphoric acid results, which from the formula given above for the anhydride will have the constitution :—

(I.)



From this the usual formula of pyrophosphoric acid (II.) is immediately derived.

The Acetylene Theory of Flame.

In reply to certain objections to his acetylene theory of luminosity, Professor Lewes enumerates the following four bases upon which his theory rests:—

1. That the largest proportion of the unsaturated hydrocarbons in a gas flame are converted into acetylene before luminosity commences.

2. The acetylene develops luminosity when heated to a temperature at which it decomposes, the conditions under which this takes place rendering the presence of atmospheric oxgen impossible.

3. That the temperature necessary to decompose acetylene with luminosity is sufficient to raise the C liberated from it to the point at which it emits light.

4. That in luminous hydrocarbon flames of sufficiently high temperatures the luminosity varies directly with the amount of acetylene present where luminosity commences.

In another place (*Proc. Royal Society*) Prof. Lewes further states that according to his theory 'the luminosity of a flame depends not so much on the percentage of C_2H_2 in the gas, but rather as to whether there are many points at which the temperature is sufficiently high to bring about decomposition of the C_2H_2. The flame of alcohol contains as much C_2H_2 as a good coal-gas flame, and yet is non or only slightly luminous, because the temperature is too low to decompose the acetylene. When burnt in O the flame becomes brightly luminous, owing to the increase in temperature. Cyanogen, which is even more endothermic than C_2H_2, burns with a non-luminous flame. This is due to the fact that CN requires a much higher temperature before it is decomposed, and it is shown that when sufficiently heated it can be made to burn with a luminous flame.

Action of HCl on Cu.

HCl saturated at 15° C. attacks Cu somewhat rapidly, with evolution of H, and the evolution of the gas becomes tumultuous if the Cu is previously immersed in a solution of platinum chloride. No action takes place with a solution of specific gravity so low as 1·083, which corresponds with the composition $HCl + 10H_2O$. When this liquid is saturated with Cu_2Cl_2 the action becomes very slow, even though the quantity of free acid present may considerably extend the minimum limit just specified. Similar phenomena are observed with Zn and Sn. A rise in temperature increases the action, and *vice versa*, doubtless in consequence of the variations in the solubility of the Cu_2Cl_2. At the ordinary temperature equilibrium is only established after a long period.

When gaseous HCl is passed into H_2O containing Cu and Cu_2Cl_2, the acid is rapidly decomposed, notwithstanding the presence of the Cu salt, and it follows that anhydrous HCl is always decomposed by Cu (*Compt. Rend.*).

Extension of Nessler's Reaction—Detection of Hg and iodides.
E. Deniges.

Mercuriammonium iodide-mercury oxide, which is found by Nessler's reaction for the detection of NH_4, is readily obtained if we bring together a mercuric salt, ammonia, a caustic alkali, and KI, on condition that the last-mentioned salt is not in excess, which would prevent the separation of the characteristic precipitate. For the production of this precipitate the joint presence of the

four substances just mentioned is necessary. If, in preparing the reagent, one of the four substances is omitted, the mixture can serve for the detection of the fourth substance, provided that other substances do not form a similar precipitate with the reagent. Experiments which have been made in this direction showed that the caustic alkali alone need be present in quantity, whilst mere traces of the other two are only needful for the detection of the fourth, by forming mercuriammonium iodide mercury oxide. It is here shown in what manner the Nessler test can serve for the detection of Hg and iodides.

A.—Detection of Hg.

1. *Simple Solutions of a Mercuric Salt.*—If it is desired to produce the precipitate in question with the mercuric salt, we put into a test glass 2 cc. of a one per cent solution of $HgCl_2$. Add 1 c. NH_4OH, and, cause the precipitate produced to disappear by a suitable addition of KI. In general 10 drops of a 20 per cent. solution will suffice. In the detection of the Hg by this method two cases are possible—(1) The solution contains more than 5 grams Hg per litre, or (2) the solution is very dilute. In the former case the reaction is carried out just as indicated, with the precaution that the solution of iodide is added drop by drop in such a quantity as just suffices for redissolving the precipitate thrown down by the NH_4OH, or until a colouration just appears, when the lye is at once added and shaken up. In the second case we take 10 to 20 cc. of the solution in question, add 1 c.c ammonia, and the quantity of iodide solution just sufficient to redissolve the precipitate. If the mercuric solution contains only the two centigrams per litre, one drop of the iodide solution is sufficient.

2. *Mercurial Compounds in general.*—If the substance is a liquid, we take 2 cc., if a solid we put a few centigrams into a test glass, add in either case 1 c. HCl and ·5 c. HNO_3, and boil the mixture until only a few drops remain in the test tube. The residue is taken up in 5 cc. water, filtered (if needful), and to the solution thus obtained there are added 2 cc. NH_4OH with 2 to 10 drops of a 20 per cent. solution of KI, according to the quantity of Hg present, and shake up. The liquid either remains clear, in which case the reaction ensues on the addition of caustic alkali, or there appears a white or coloured precipitate. If the precipitate is white the reaction is not interfered with, the addition of caustic lye is sufficient to bring up the characteristic reaction. If the precipitate is coloured it is filtered off, and the filtrate is mixed with caustic lye. A colour may appear on the addition of KI, *e.g.* in the presence of Cu. In this case we dilute strongly, so that the colour appears less intense, and then add the caustic lye.

B.—Detection of Iodides.

If the substance under examination contains metals which are precipitated by the reagent, we use the filtrate from the $(NH_4)_2S$ precipitate. We filter, acidulate with HCl, boil until the H_2S is expelled, and supersaturate with NH_4OH. We add to the liquid a little caustic lye and a few drops of $HgCl_2$, and shake up. If there appears a precipitate of more or less deep red colour, we may infer the presence of I. In the absence of I the precipitate is white or slightly yellowish. We can prepare fresh for each time of using a mixture of 1 c. NH_4OH, ½ c. soda-lye, and a few drops of solution of sublimate. If this mixture, which is yellowish, is brought into contact with the liquid obtained above, there appears in the presence of I the characteristic precipititate of mercuric ammonium-iodide mercuric oxide. The reaction is very sensitive, and is applicable also to insoluble iodides.

HONOURS EXAMINATION IN 1897.

We have just learnt on the highest authority what the Department intends with respect to this examination. For some years past the success of Higher Grade Board and Organised Science School Scholars in Honours Examinations has been too great to please the Department, especially as the opinion, perhaps not altogether unfounded, has grown up that these successful students have not that intimate knowledge of Chemistry that should characterize an Honours student, as is proved by the fact that very few indeed of them ever attempt the Honours Theory examination. The Department has therefore resolved that a knowledge of theory shall be exacted, and the two or three days' examination referred to in the syllabus is introduced for this very purpose. From what we could gather, a preliminary examination will take place somewhat on the same lines as at present, in the various Science Schools. After this work has been examined promising students will be required to attend at South Kensington in order to undergo the further test, which will be spread over two or three days, as intimated in the syllabus. By this means it is hoped to keep down the successes in Honours Chemistry Examinations to the level of other subjects, an end which will undoubtedly be more than gained, should the procedure mapped out by our informant, whose opportunities for obtaining reliable information we can vouch for as absolutely unique, be actually carried into effect. The success of the Board School girl Honours candidates in Practical Chemistry is without doubt responsible for this drastic change.

ORGANIC CHEMISTRY NOTES.

BY J. T. HEWITT, M.A., PH.D., D.SC.

Professor of Chemistry, People's Palace Technical Schools.

BESIDES Berberine, another alkaloïd known as Hydrastine is found in the roots of *Hydrastis canadensis*. This substance was discovered in 1862, and the formula $C_{21}H_{21}NO_6$ assigned to it. Our knowledge of its constitution we owe to a series of beautiful researches carried out between the years 1886 and 1891 by Freund and his pupils. Freund and Will extracted the powdered root with ether, evaporated the solution, and recrystallised the residue from alcohol. The free alkaloïd forms shining trimetric prisms, which melt at 135°, and are almost insoluble in water. One part of the alkaloïd dissolves in 1·75 parts of chloroform, 15·7 of benzene, 83·46 of ether, and 120·27 of alcohol at 15°. The base has a bitter taste, and is optically active ; it is lævorotatory in chloroform solulution, but strongly dextrorotatory in hydrochloric acid.

Freund and Will found that when 10 grams of hydrastine and 500 c.c. of nitric acid (sp. gr. 1·3), to which 25 c.c. of water are added, are heated to 50°–60°, that limited oxidation, and hydrolysis take place, opianic acid and a new base hydrastinine being produced—

$$C_{21}H_{21}NO_6 + O + H_2O = C_{11}H_{13}NO_3 + C_{10}H_{10}O_5.$$

Opianic acid is closely related to meconine (previously mentioned in the article on berberine), so we shall first take these somewhat frequently occurring breaking-down products of alkaloïds into account. These compounds, as their names indicate, were first obtained from opium alkaloïds, meconine being detected by Couerbe in 1832 in opium, whilst opianic acid was produced by Wöhler and Liebig in 1842 by the oxidation of narcotine. Wöhler further found that opianic acid was converted by further oxidation into hemipinic acid. Anderson found that narcotine also gives a compound, which he called opianyl, on oxidation, and Laurent subsequently showed that opianyl and meconine were identical. The relationship of meconine, opianic acid, and hemipinic acid to one another is seen by the following formulæ :—

Meconine - - - - - -	$C_{10}H_{10}O_4$.
Opianic acid - - - - - -	$C_{10}H_{10}O_5$.
Hemipinic acid - - - - - -	$C_{10}H_{10}O_6$.

Opianic acid was found by Matthiessen and Foster to be transformed into a mixture of the other two substances if evaporated with caustic potash, the reaction may be compared to Cannizzaro's conversion of benzaldehyde into a mixture of potassium benzoate and benzyl alcohol by the same agent—

$$2C_{10}H_{10}O_5 = C_{10}H_{10}O_4 + C_{10}H_{10}O_6.$$

$$2C_6H_5CHO + H_2O = C_6H_5CH_2OH + C_6H_5.COOH.$$

We see, however, that in Cannizzaro's reaction the elements of water are taken up, whilst in the case of opianic acid this does not happen. But we have another analogy between the behaviour of benzaldehyde and that of opianic acid in the reduction of the former to benzyl alcohol by water and sodium amalgam, whilst in the latter case meconine is formed.

$$C_6H_5.CHO + 2H = C_6H_5.CH_2OH,$$

and

$$C_{10}H_{10}O_5 + 2H = C_{10}H_{12}O_5 = C_{10}H_{10}O_4 + H_2O.$$

Thus it would seem that we had in meconine the internal anhydride of an alcohol-acid, whilst opianic and hemipinic acids are the corresponding aldehyde-acid and dicarboxylic-acid. Our constitutional formulæ would now become :—

Meconine - - - - $C_8H_8O_2\begin{cases}CH_2\\CO\end{cases}O.$

Opianic acid - - - - $C_8H_8O_2\begin{cases}CHO\\COOH.\end{cases}$

Hemipinic acid - - - $C_8H_8O_2\begin{cases}COOH\\COOH.\end{cases}$

There is a possible alternative in the case of meconine, viz., that it is the dialdehyde of hemipinic acid with the formula—

$$C_8H_8O_2\begin{cases}CHO\\CHO\end{cases};$$

such a formula is, however, highly improbable in the light of the reaction of opianic acid with caustic potash, and is negatived by the fact that whereas opianic acid may be reduced to meconine, the latter cannot be re-oxidised to the former.

Hemipinic acid when heated with concentrated hydrochloric acid gives, firstly, an acid $C_8H_8O_4$, and then an acid $C_7H_6O_4$. These acids were named methylhypogallic and hypogallic acids respectively by Matthiessen and Foster; the latter may be obtained more readily by heating hemipinic acid with concentrated hydriodic acid.

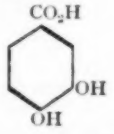
$$C_{10}H_{10}O_6 + 2HI = CO_2 + 2CH_3I + C_7H_6O_4.$$

Thus it is evident that hemipinic acid must have the constitutional formula :—

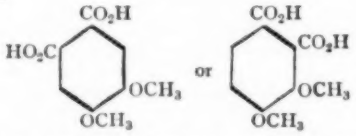
$$C_6H_2(OCH_3)_2(COOH)_2,$$

since its methyl groups are split off as methyl iodide on heating with hydriodic acid. (General reaction of methoxyl groups.)

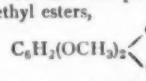
We now have to consider the relative positions of the groups in hemipinic acid. Beckett and Wright showed that hypogallic acid was identical with proto-catechuic acid.



Since hemipinic acid readily yields an anhydride on heating, it must be either :—

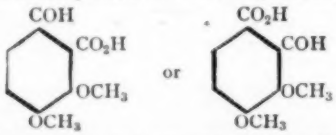


Wegscheider showed that hemipinic acid is capable of yielding two distinct acid methyl esters,



this is only explicable by means of the latter of the two formulæ.

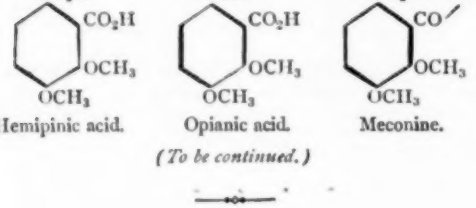
This gives us two possible formulæ for opianic acid :—



That the former formula is correct is shown by the facts that when opianic acid is heated with dilute hydrochloric acid, isovanillin, $C_6H_2(COH)(OH)(OCH_3)$ 1 : 3 : 4, is produced (Wegscheider); whilst on distillation of sodium opianate with soda-lime, dimethyl-vanillin is formed (Beckett and Wright).

$$C_6H_2(OCH_3)_2(COH)(COONa) + NaOH = Na_2CO_3 + C_6H_2(OCH_3)_2(COH).$$

We can thus take the following formulæ as fully established :—



Hemipinic acid. Opianic acid. Meconine.

(To be continued.)

THE LENARD-RÖNTGEN X-RAYS.

BY DOUGLAS CARNEGIE, M.A.

In dealing with the so-called X-rays of Lenard and Röntgen, two courses are open to the writer. He may either discuss the physical nature of the rays, or he may deal in a purely empiric way with the mode of production of these new rays and with some of their ascertained properties.

In the present article the latter course will be adopted, and we refer to recent issues of *Nature* the reader who is desirous of knowing what progress has been made in the direction of answering such questions as :—

Are Röntgen's rays transverse ether waves like light waves but of much shorter wave length?

Are they the hitherto unrecognised longitudinal ether waves?

Are they waves at all, or are they radial streams of electrified matter?

The fact that the title 'X-rays' retains its currency is sufficient evidence of the uncertainty that still prevails as to the true inwardness of the new radiation.

In order to produce X-rays we require a source of electricity which is able to force an electric current across an air gap two inches wide, *i.e.*, which is capable of producing a spark two inches long in air under ordinary conditions of pressure.* If one had to depend for this effect on galvanic cells solely, at least 23,000 to 24,000 separate cells would be required. For though the galvanic cell furnishes a comparatively large quantity of electricity, it supplies this quantity at a low pressure or voltage, and the pressure necessary to force the current through the highly resistant two-inch air gap would demand the co-operation of the above stated number of individual cells.

However, by means of a piece of apparatus perfected by Ruhmkorff and known as an induction coil, the two-inch air spark may be obtained with the use of only some half-dozen cells.† This, at first sight, looks somewhat like the creation of energy by a mere machine—like the realisation in a particular direction of the time-worn chimera of the perpetual motion. But it is not so.

Let us think of electricity as an incompressible fluid—to fix our ideas, let us think of it as we think of water. Just as water *per se* is not energy, so electricity *per se* is also not energy. But just as water in motion possesses energy—possesses the power of doing work—so electricity in motion, or, as it is usually called, a current of electricity, possesses energy.

Suppose A and B (Fig. 1) to represent two cylindrical vessels, of which A has twice the diameter of B. At the height of 1 foot A is provided with a stop-cocked outlet s^1. A also communicates with

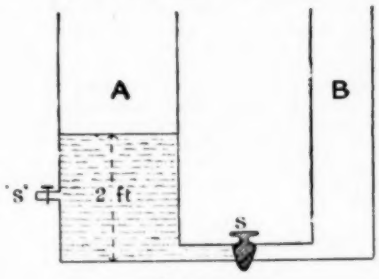


FIG. 1.

B by means of a tube which can be opened or closed by a stop-cock *s*. Suppose *s* closed and A filled to a height of 2 feet with water, and suppose further that the mass of water necessary for this is 100 lbs.

Now open s^1 and let the resulting stream of water work an ideally perfect turbine or water-wheel connected with an ideal apparatus for compressing air. Let the flow from s^1 continue till the water in A has sunk one foot, then close s^1. Admit the compressed air to the top of the cylinder A and allow it to exert its pressure on the surface of the 50 lbs. of water remaining in A. Open *s*. The expansion of the air in A would just suffice to force the whole of the water remaining in A into B, which would consequently be filled to a height of four feet.

Now the 50 lbs. of water in B has precisely the same quantity of gravitational energy as the original 100 lbs. had in A. Though we have now only one half the quantity of water we had at first, yet we have this half at double the original pressure, and what is lost in mass is gained in head or pressure. By an ideal *self-acting* mechanism the water has been obtained in B under such conditions that its flow therefrom is capable of overcoming a resistance (*e.g.*, throwing a fountain jet, which practically amounts to 'water—a spark') twice as great as that which it could have overcome by its flow from its initial condition in A.

This arrangement of tubes, compressor, and water is the hydrostatic analogue of the combination of voltaic cell and induction coil. The cell transforms chemical energy into a certain definite amount

* In most papers that have appeared on this subject, it is stated that while a ten-inch spark is to be preferred, a five-inch spark will do. This seems to imply that a five-inch spark is the minimum one that can call an X-ray silhouette into being. This is quite misleading. The writer has taken the stereotyped Röntgen 'photographs' of coins, keys, pincushions, etc., with an exposure of ten minutes, and a spark not more than an inch and a quarter in length. For such work he has never employed a longer than a two-inch spark. (A coil giving such a spark costs from £6 to £8.) It is only in the treatment of thick objects, such as feet or arms, that the longer sparks are, or seem to be, necessary.

† The most convenient battery to use is one composed of storage cells or accumulators. These can generally be very cheaply hired from Electric Supply Companies.

of electrical energy in the form of a large quantity of electricity Q at a low pressure *e*. The ideal induction coil modifies the factors of this definite quantity of electricity, and gives it out unchanged in amount, but in the form of a small quantity *q* at a high pressure E. In the case of an ideal coil the product Q*e* would equal the product *q*E.

A Ruhmkorff coil essentially consists of two coils, an inner thick

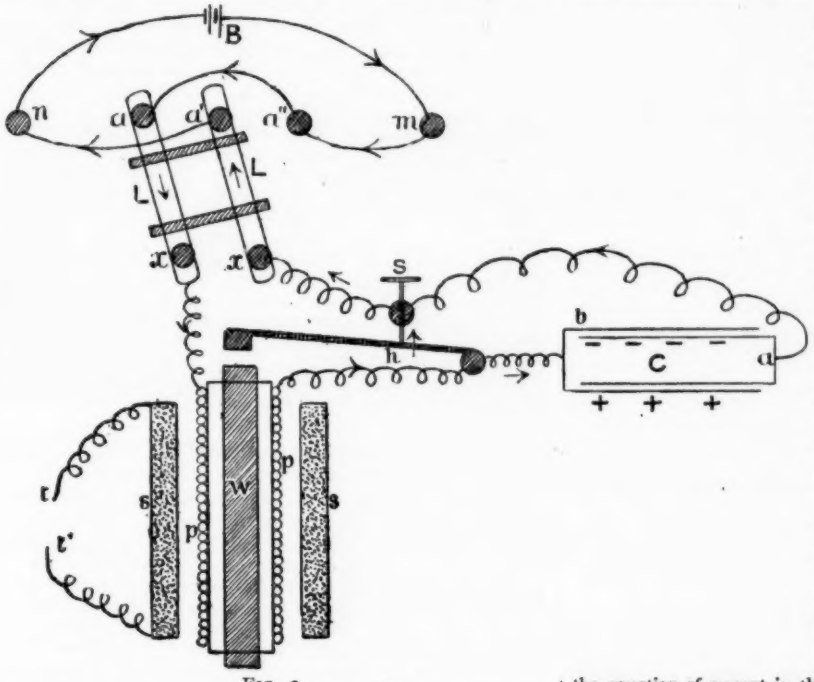


FIG. 2.

wire coil *p* (Fig. 2) of few turns surrounded by an outer thin wire coil *s* of several thousand turns. Not only are the spirals of the outer coil most carefully insulated by non-conducting material from one another, but the coil as a whole is thoroughly insulated from the inner coil, with which it has no conducting connection whatever. The inner coil is called the primary coil, and the outer one the secondary coil.*

The cylindrical space enclosed by the primary coil is always filled with a bundle of soft iron wires, and round this coil a current from a battery B is made to circulate intermittently. Although the low resistance of this coil would seem to call for a low resistance in the battery (*i.e.*, multiple joining of cells) for maximum effect, yet by reason of the soft iron core the coil's inductance is high; that is to say, the coil only slowly responds to the varying electrical conditions impressed upon it, so that a current started in it creeps up but slowly to its full strength. To diminish as much as possible this effect of inductance which is adverse to the efficient working of the coil, it is well to increase the resistance in circuit by joining the battery cells up in series (*i.e.*, zinc pole to carbon or equivalent pole) and not in multiple (*i.e.*, zinc to zinc and carbon to carbon).

The intermittence of the current in the primary coil is automatic-

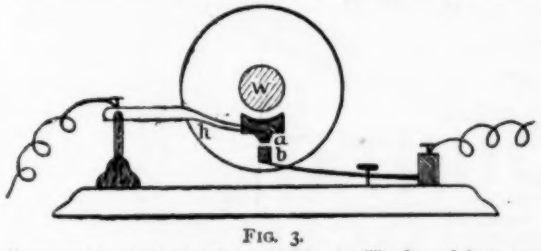


FIG. 3.

ally secured by the device shown in Fig. 3. The flow of the current makes the iron core for the time being an electro-magnet, and this attracts the movable hammer *h*. The upward motion of the hammer, by separating *a* and *b*, breaks the circuit; the current ceases, and the magnetism of the core disappearing, the hammer falls back on *b*, thereby completing the circuit again and starting the cycle afresh.

Whenever a current is started in *p* (Fig. 3) a momentary current of high pressure is induced in *s* in the opposite direction by a kind of electrical infection (formerly the phenomenon would have been described as one of 'action at a distance'); and, *vice versâ*, when the current is stopped in *p* a momentary high-pressure current is induced in *s* in the same direction as the primary current.

We might therefore expect to obtain between the terminals *t*, *t*¹ of the secondary coil intermittent high-pressure currents *alternating in direction*—now passing from *t* to *t*¹, now from *t*¹ to *t*. But, as a matter of fact, the induced current in the secondary coil, which is called into being by the making (starting) of the current in the primary coil, is suppressed by the use of a simple piece of apparatus called the condenser, C, which is usually enclosed in the base of the Ruhmkorff coil. This condenser essentially consists of two large sheets of tin foil, insulated from each other by waxed paper, and folded in such a way as to demand but little room. Each sheet of tin foil has a separate electrical connection with the circuit which includes the primary coil.

Besides serving to suppress the secondary induced current at make (thus ensuring a one-directional current between the terminals *t t*¹), the condenser subserves the further function of rendering rapid and decisive the cessation of current in the primary coil when the hammer rises from its bed *b* (Fig. 3). As we have before hinted, on such rapidity depends the efficiency of the coil.

For electricity further resembles water in that it possesses a property akin to inertia—*i.e.*, disinclination to change its state whether this be one of rest or of motion. Just as it is impossible to *instantly* check the flow of water in a pipe by turning off a tap (the water flows on after the tap is shut and expends its energy on the closed tap, sometimes bursting it), so it is impossible to stop *instantaneously* the current of electricity circulating in the primary coil. For some time after the hammer leaves its bed the flow of electricity persists as an inertia, or so-called extra current, under a pressure so greatly increased as to suffice in the absence of a condenser to make the current leap across the air space, separating *a* and *b* (Fig. 3) or *s* and *h* (Fig. 2), where it rapidly volatilises and destroys the platinum contacts by its enormous heating effects. Now the condenser acts as a kind of huge electrical reservoir, rapidly absorbing this extra current, and so reducing its pressure that it is unable to spark across more than a very small air gap between *a* and *b* (Fig. 3) or *s* and *h* (Fig. 2). In other words, with a condenser in circuit the primary current *practically* ceases the moment the hammer rises from its bed. It converts a lingering decline of current into a sudden death.

In many electrical problems it suffices to regard a current of electricity as we regard a current of water in a pipe—as a purely one-directioned affair; but in other cases, notably in the phenomena of electrolysis, and discharge through gases, it is necessary to pay heed to the essentially dual nature of an electric current, conceiving it as a flow of positive electricity in one direction (conventionally called the direction of the current), and an equal flow of negative electricity in the opposite direction. Thinking of a current in this way, we may obtain with the help of Fig. 2 a rough idea of the *modus operandi* of the condenser in an induction coil. Suppose the arrows represent the direction of the positive flow. No sooner does the current flow, than the circuit of the primary coil is broken by the spring of the vibrating hammer *h* leaving the adjustable screw *s*. The result is that the inertia, or extra current at break, instead of sparking across at *s* and *h*, surges into the condenser, the positive electricity into the outer coating *b*, the negative electricity into the inner coating *a*. Now it is clear from the diagram that these two coatings of the condenser are in *permanent* connection with each other through the battery. The condenser, therefore, after becom-

* The secondary coil of Mr. Spottiswoode's 42-inch spark induction coil contains 280 miles of fine wire wound in 340,000 turns.

ing charged, promptly discharges itself through the battery, and causes a flow of positive electricity in the primary coil in a direction opposed to that of the positive flow which the battery produces as soon as the spring hammer has sprung back into contact with *s*. If the condenser be properly proportioned or 'tuned' to the size of the coil, the greater part of its discharge takes place before the primary circuit has been re-instated by the re-establishment of electrical contact at *s*. The result is much the same as if the battery current had not only been sharply stopped, but had been actually reversed, and the effect on the voltage or pressure of the secondary induced current at break is virtually to double the value it would have attained in the absence of the condenser. But after contact is made at *s*, the condenser current still continues to flow in rapidly diminishing strength, thereby opposing the current due to the battery in the primary coil. Hence the battery current in the primary creeps up comparatively slowly from zero to its full value; and since slow change of current has very feeble inductive effects, it follows that the current induced in the secondary at make is negligible. It has not voltage enough to spark across the space between the secondary coil's terminals t and t^1.

When working with induction coils it is often necessary to change the direction in which the secondary current flows between t and t^1. This, of course, could be effected by reversing the connections between the coil and battery at n and m, but it can be much more easily and expeditiously effected by the use of a commutator. There are many forms of commutator, but the one represented in Fig. 2 is very simple, and shows the principle well. L and L^1 are two strips of metal joined rigidly together by two non-conducting braces, the whole contrivance being made to rotate round the studs x x, so that the distal ends may be brought into contact with either pair of studs a a^1 or a^1 a^{11}. It is obvious that if the commutator be rotated from the position figured so that it covers a' and a'', the battery current will then flow round the primary in a direction opposite to that indicated by the arrows figured.

(*To be continued.*)

REVIEWS.

The Suggestive Composition Book: Parts I. to IV. London: Blackie & Son, Limited.

These are useful little books as introductions to simple composition lessons and easy exercises in forming sentences. The print is large and clear, and the sentences given as examples, are mostly well suited for the purpose in view. They would probably have to be supplemented by the teacher, but that is almost implied in the title, 'Suggestive.'

Johnston's Natural History Plates: Apes and Monkeys. Illustrations of Trees: The Apple Tree. London: W. & A. K. Johnston.

These are two capital wall pictures for use in oral teaching. The first shows a group of quadrumana numbering seven, and ranging from the Oran-utan to the Marmoset; the second contains a good view of an apple-tree with separate illustrations of the leaves, flowers, fruit, and wood. The pictures are varnished and mounted on rollers.

The Royal Crown Readers. Sixth Book. The Royal Crown Infant Reader. No. 1. London: Thomas Nelson & Sons.

The Sixth Book of the Royal Crown Series, with its capital selection of reading lessons, exhibits all the features that have made the previous volumes so attractive and useful. The reading matter is interesting, varied, and much of it quite new to school books. A few passages of poetry from Shakespeare, Milton, and Shelley are printed near the end of the book, and may serve as pieces for recitation. Other good poems are interspersed with the prose lessons. Abundant word exercises are given at the end of the several lessons, and a body of notes and explanations, and sections on word-building, derivation, grammar, and analysis, are found at the end of the volume. The pictures are numerous and of excellent quality, especially the coloured ones, which one may well regard as the perfection of school book illustration.

'Charming' is the word which suggests itself as most applicable to the Crown Infant Reader, and it applies as well to the subject matter of the simple and interesting readings as to the typographical appearance, and to the remarkable set of illustrations, both the coloured ones and those in black and white. The pictures on pages 23, 35, 38, and 59, to name no others, seem to us exquisite. These books must become favourites with all children who are privileged to learn from them.

Euclid's Elements of Geometry. Edited for the Syndics of the Cambridge University Press by H. M. Taylor, M.A., Fellow and formerly Tutor of Trinity College, Cambridge.

This is the most important edition of Euclid's Elements which has been issued of late years. We would advise all teachers who are tempted by the admitted imperfections of Euclid's system to go in for some modern system of geometry to get a copy of this book. We believe they will find in it all they want. The author has wisely retained Euclid's division into books, but he has added propositions wherever necessary. For instance, he demonstrates that case of the equality of triangles which is wanting in Euclid, and has added many demonstrations of familiar properties of triangles, squares, and circles, for lack of which the pupil who has been brought up on Todhunter and Potts is compelled to make his proofs of riders much longer than they need be made. Varied proofs are given of I. 47, II. 8, and many other propositions. The language used in the older English editions of Euclid has been modernised, and the proofs rendered less cumbersome by the omission of superfluous verbiage. The 21 propositions of Book XI. usually studied are followed by proofs of the chief properties of the rectilineal solids, the geometry of the sphere, and a succinct treatment of the principles of perspective. Additional completeness is given to the book by proofs of the theorems discovered by the most famous geometricians of both ancient and modern times. We recommend the book to our readers in the confidence that they will be perfectly satisfied with it.

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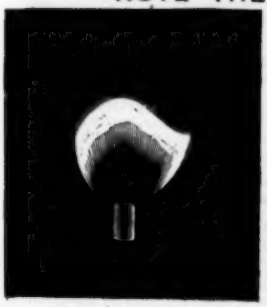

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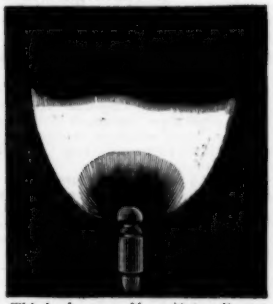

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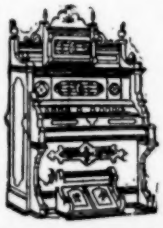

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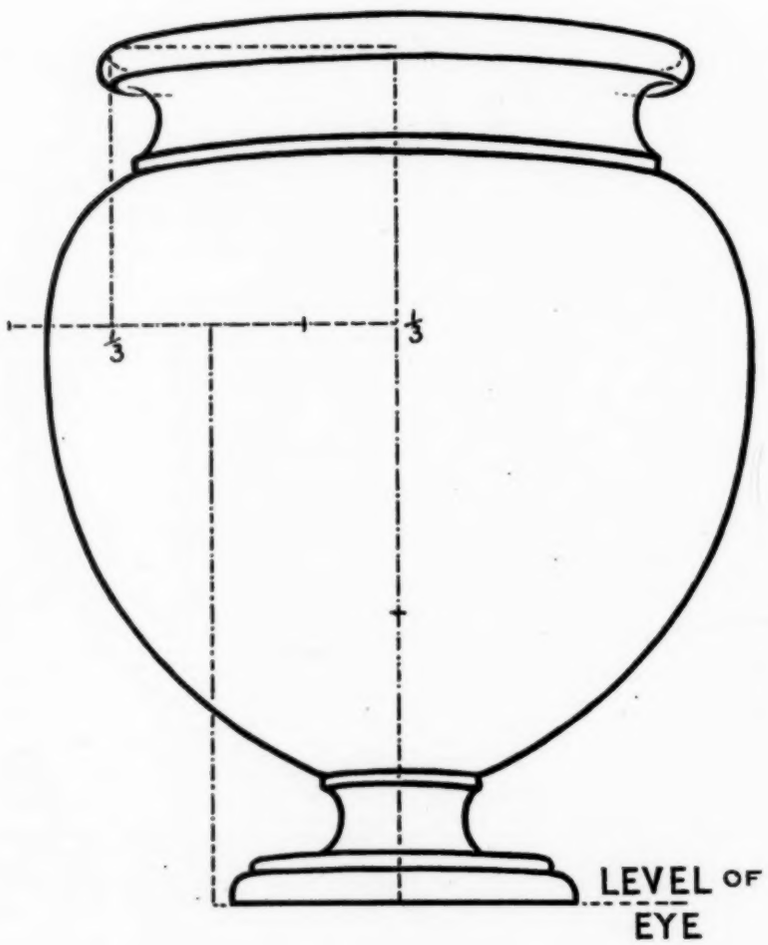

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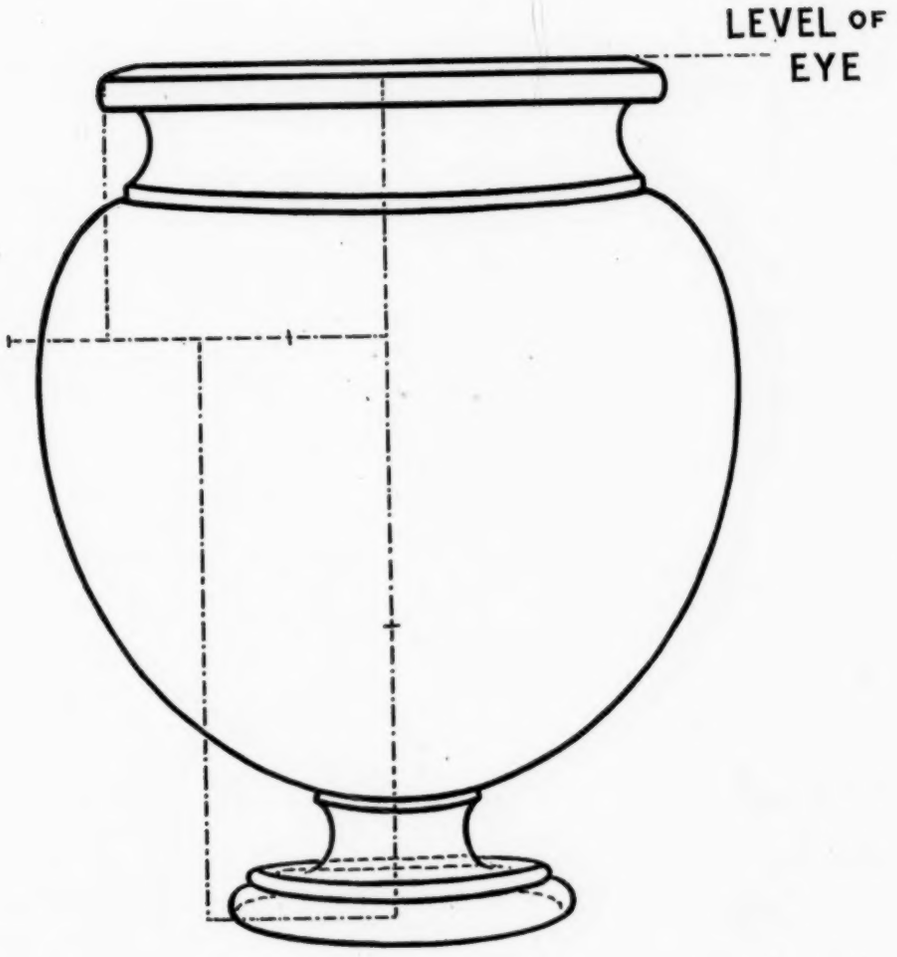

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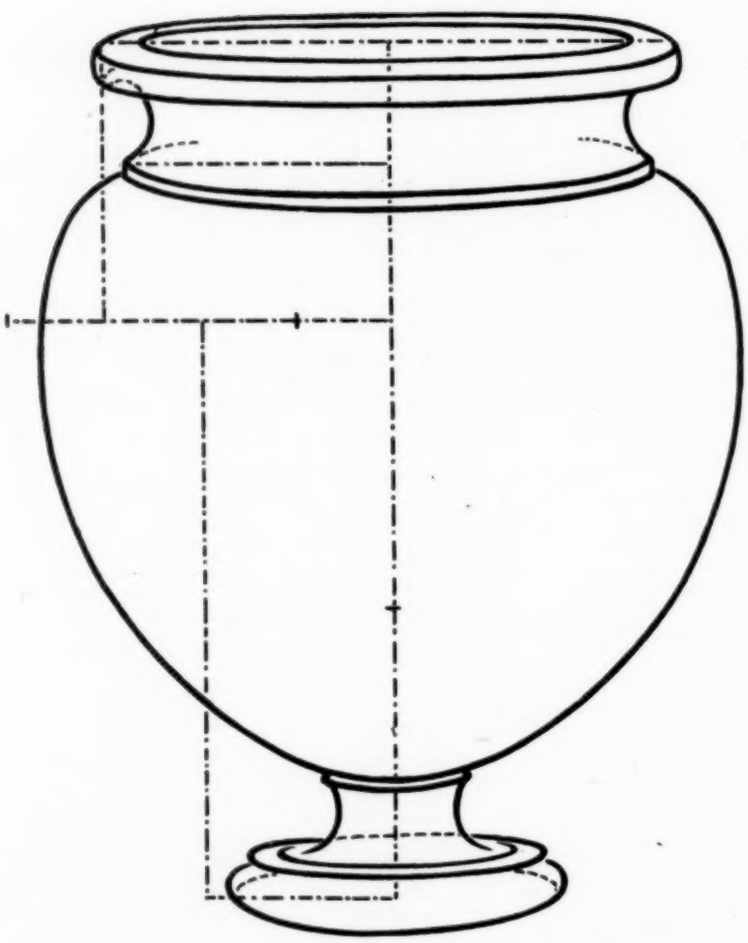

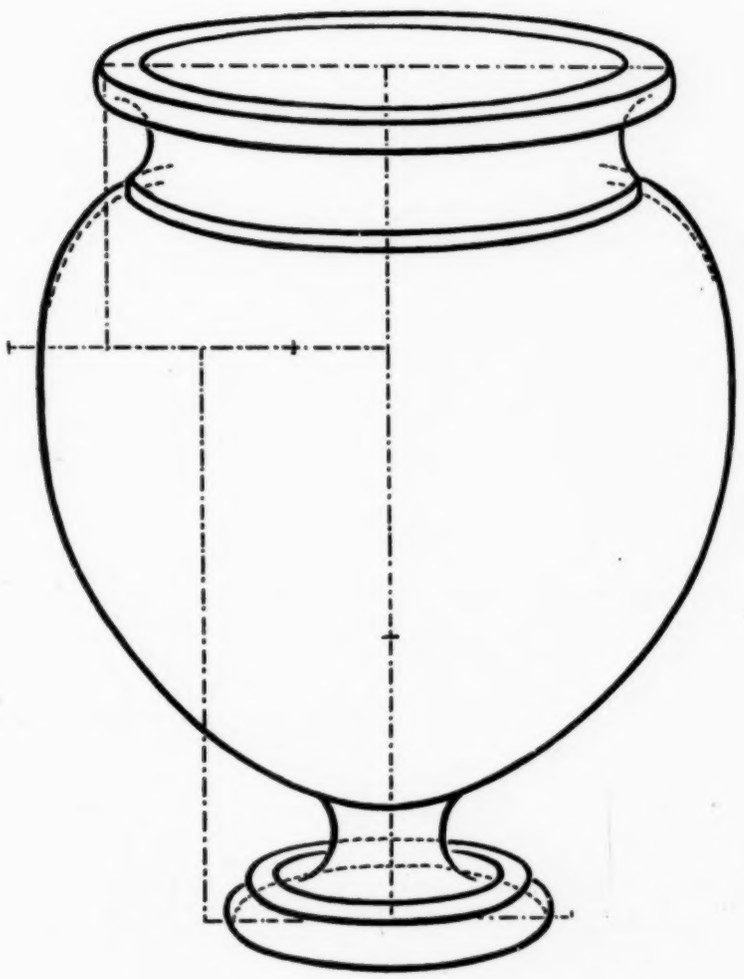

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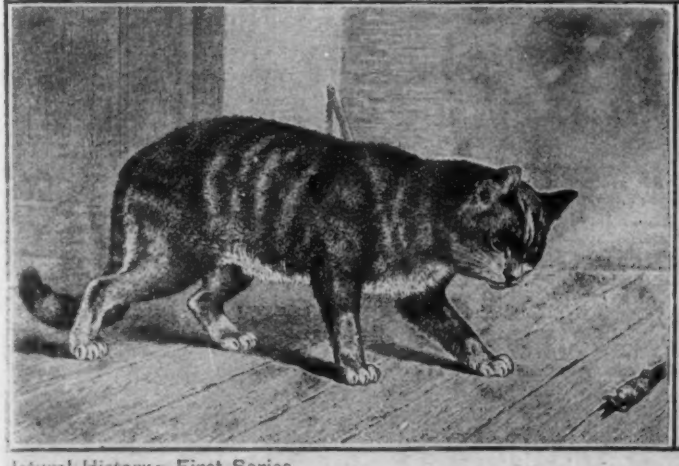

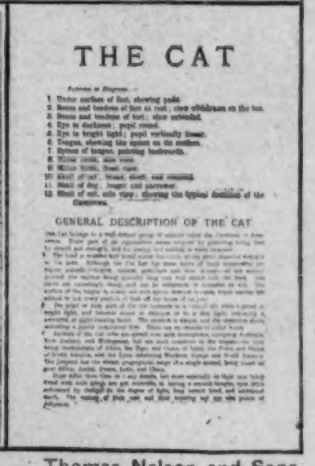

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